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1954



DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES



1954
(SECOND SESSION)

PARLIAMENT OF NEW SOUTH WALES

REPORT
OF THE
DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES
FOR THE
YEAR ENDED
30TH JUNE, 1954

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AS AT 30th JUNE, 1954

DEPARTMENT OF AGRICULTURE

Minister for Agriculture and Food Production	Hon. E. H. GRAHAM, M.L.A.
Under Secretary and Director	Dr. R. J. NOBLE.
Assistant Under Secretary	Mr. E. O. TOUT.
Assistant Director of Agriculture	Dr. H. J. HYNES.

Central Administration—

Accountant	F. L. HEDGES.
Chief Clerk	J. I. MARROTT.
Personnel Officer	C. W. WEARNE.
Pastures Protection Officer	S. W. WISE.
Legal Officer	J. L. HAGER.
Architect	H. A. BROWNE.
Supervisor, Experiment Stations and Farms	L. T. JUDD.
Executive Officer, Co-ordinated Extension Services	L. J. GREEN.

Regional Supervisors of Agriculture—

Southern Region	R. C. MADSEN.
Far North Coast Region	S. R. BALLARD.
Western Region	B. D. AMENT.

Government Grain Elevators—

Manager	S. C. HODGSON.
Assistant Manager	E. M. WARNE.
Engineer (Acting)	H. S. N. WELLS.

Division of Plant Industry—

Chief	W. H. G. POGGENDORFF.
Deputy Chief	A. PEARSON.
Principal Agronomist (Pastures)	C. K. VEARS.
Principal Agronomist (Research)	Dr. S. L. MACINDOE.
Principal Agronomist (Extension)	L. J. GREEN.

Division of Horticulture—

Chief	H. BROADFOOT.
Deputy Chief	H. W. EASTWOOD.
Principal Fruit Officer (Viticulture)	H. L. MANUEL.
Principal Fruit Officer (Extension)	J. A. BALLANTYNE.
Principal Fruit Officer (Research)	Dr. F. T. BOWMAN.
Senior Inspector (Export and Import Branch)	L. T. BILBE.

Division of Animal Industry—

Chief	Dr. H. G. BELSCHNER.
Deputy Chief	C. C. BLUMER.
Director of Veterinary Research	G. EDGAR.
Chairman, Board of Tick Control, Lismore	R. M. WATTS.
Principal Veterinary Officer	J. N. HENRY.
Principal Livestock Officer (Sheep and Wool)	A. K. CANTRILL.
Principal Livestock Officer (Horses, Cattle and Goats)	W. J. B. MURPHY.
Principal Livestock Officer (Pigs)	G. M. D. CARSE.
Principal Livestock Officer (Poultry)	V. H. M. BRANN.
Principal Livestock Officer (Apiculture)	A. A. CLEMSON.

Division of Dairying—

Chief	G. MCGILLIVRAY.
Deputy Chief	A. C. SMALL.
Principal Dairy Officer	A. B. SHELTON.
Principal Dairy Officer (Herd Improvement)	I. W. SCOTT.

Division of Science Services—

Chief	Dr. R. J. NOBLE.
Chief Biologist	Dr. C. J. P. MAGEE.
Chief Entomologist	S. L. ALLMAN.
Chief Chemist	T. H. JOHNS.
Chief Botanist and Curator, Botanic Gardens and National Herbarium	R. H. ANDERSON.

Division of Information and Extension Services—

Chief	H. PARRY BROWN.
Editor of Publications	R. J. K. SYNNOTT.
Organiser, Agricultural Bureau	J. J. SLATER.
Senior Extension Officer (Women's Services)	Miss N. M. FOSKETT.

As at 30th June, 1954
Department of Agriculture—*continued.*

Division of Marketing and Agricultural Economics—

Chief	C. J. KING.
Principal Economics Research Officer	P. C. DRUCE.

Hawkesbury Agricultural College—

Principal	E. A. SOUTHEE.
Deputy Principal	H. R. RICHARDSON.

Wagga Agricultural College and Experiment Station—

Principal	B. DOMAN.
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Wagga Agricultural Research Institute—

Director	Dr. A. T. PUGSLEY.
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Experiment Farms and Stations—

Bathurst Experiment Farm ...	Manager	J. A. HOLBECH.
Condobolin Experiment Farm	Manager	F. C. MORRIS.
Cowra Experiment Farm.....	Manager	W. R. WATKINS.
Glenfield Veterinary Research Station	Director	G. EDGAR.
Gosford Citrus Experiment Station	Officer-in-Charge	L. F. MANDELSON.
Grafton Experiment Station ...	Manager	W. H. DARRAGH.
Griffith Viticultural Nursery...	Superintendent	A. C. CLIFTON.
Leeton Experiment Farm	Manager (Acting)	G. A. CRAWFORD.
New England Experiment Farm	Manager	E. C. POWELL.
Poultry Experiment Station, Seven Hills	Manager	D. C. DUNCAN.
Tamworth Agricultural Experiment Station.	Acting Officer-in-Charge	J. A. LOVERIDGE.
Temora Experiment Farm	Manager	R. W. SHELLEY.
Trangie Agricultural Experiment Station	Manager (Acting)	E. G. CUTHBERTSON.
Wollongbar Experiment Farm	Manager	G. GILES.
Yanco Experiment Farm	Manager	B. O. FRENCH.
Murrumbidgee Irrigation Area Agricultural Service	Agricultural Organiser	D. V. WALTERS.

NEW SOUTH WALES

DEPARTMENT OF AGRICULTURE

Report of the Under Secretary and Director to the Minister for Agriculture
and Food Production for the Year Ended 30th June, 1954

Department of Agriculture,
Sydney, 31st August, 1954.

Dear Sir,

Herewith my Report of the Department of Agriculture for the year ended 30th June, 1954.

Production Trends.

The production of some commodities continued to increase but the increases and their range were not comparable with those of 1952-53. However, with the exception of butter, mutton and lamb, there were no marked declines.

The trends were attributable largely to the seasonal conditions which were unfavourable over most of the State for much of the year. In most districts the conditions were much drier than normal, even though extreme drought was not experienced elsewhere than the northern tablelands and far north coast. In the latter area the drought was broken in February by the opposite extreme, serious floodings which affected all coastal river districts north of Sydney.

It was not until late winter, 1953, that the long dry spell which began in the autumn of 1953 was broken in most areas. Some areas received satisfactory spring rains and others remained very dry. By mid-summer, drought prevailed on the New England and far north coast. Late in summer the position throughout the State changed completely, when almost all areas experienced abnormally heavy rains.

The resultant floods in the Tweed and Richmond rivers were the worst on record. Damage was considerable. Coastal farms' production was very adversely affected.

In the autumn and early winter of 1954 rainfall was much below average in most parts of the State, the major exception being the far north coast where further floodings occurred during May.

At 30th June, 1954, rain was urgently required everywhere but in the north coastal districts.

Wheat sowings in 1953 were higher than expected and, despite the variable and at times unfavourable season, the average yield of the 1953-54 harvest was very satisfactory although not quite as high as that of 1952-53. Due largely to generally dry conditions during the 1954 sowing season and partly to uncertainty over future prices and prospects, the area sown in 1954 will probably prove to be slightly less than that of the previous season. At the end of June, seasonal conditions for wheat were variable and crop prospects were generally unsatisfactory.

The extremely adverse seasonal conditions in maize districts resulted in a smaller harvest, from an area slightly greater than that of the previous season. On the other hand rice areas and production both increased. The rice harvest was one of the largest on record, although the grain quality was generally below normal.

The area sown to improved pastures again expanded significantly. Continued expansion of improved pastures, particularly in tablelands and slopes districts, remains one of this State's most important developments of recent years.

Sheep numbers further increased and at 31st March, 1954, were at the highest level in this century. There also appears to have been some further swing from crossbreds to merinos because of the continued buoyancy of the wool market. This swing and the retention of more sheep for wool production no doubt accounted for the year's significant reduction in mutton and lamb production.

Butter production showed a marked decline due to the extremes of weather on the north coast, the main butter producing region, where the record floods in mid-summer followed a protracted drought.

The production of other livestock commodities showed little change. Beef and veal, pigmeat, eggs and cheese all increased slightly. However, beef cattle numbers showed some decline, as did the number of cattle on registered dairies. The number of pigs on farms increased appreciably. The long-standing decline in horse numbers continued.

The supply of farm machinery showed some further improvement and can now be regarded as generally satisfactory, although a few machines of particular makes remain in short supply.

Unfortunately the availability of many building and fencing materials definitely deteriorated. Steel fencing posts remained in extremely short supply throughout the year and, in the latter half, products such as fencing wire, galvanized piping and galvanized iron were very difficult to obtain. At the close of the year there was no prospect of early alleviation of widespread shortage of those farm requisites, essential for increased farm development.

Superphosphate Supply.

The critical situation regarding superphosphate supplies continued. Demand for superphosphate has doubled, largely because of the remarkable expansion in improved pastures, but superphosphate production has not kept pace; mainly because of manufacturers' inability to install additional plant.

The Department has given every possible assistance to superphosphate manufacturers, but there is cause for serious apprehension as to any substantial, immediate improvement in the position.

Food Production Policy.

The State continued active co-operation with the Governments of the Commonwealth and the other States through the Australian Agricultural Council and the Standing Committee on Agriculture, to promote an expansion in food and fibre production. Particular attention has been paid to promotion of low cost production and to encouragement of increased efficiency in the rural industries.

Considerable developmental work proceeded on farms throughout the State despite shortage of some materials, and the State's production potential continued to increase.

Some of the less important industries experienced quite severe marketing difficulties, and wheat prices declined, but the producer is still receiving highly satisfactory returns for wool and reasonably profitable prices for wheat and most meats.

Farm incomes, generally, are still at relatively high levels. This factor and the special concessional depreciation allowances available exclusively to the rural community, the relatively high level of income taxation, and the more adequate availability of credit for established farmers, have encouraged a high level of capital investment on many farms.

Capital investment has added greatly to the State's productive potential and, given reasonable seasonal conditions, the production of wool and those foods for which satisfactory markets exist should further expand in the very near future.

Australian Agricultural Council and Standing Committee on Agriculture.

The Australian Agricultural Council met in Canberra in July, 1953, and in Melbourne in January, 1954. Three associated meetings of the Standing Committee on Agriculture were held.

Among the many matters considered was foot and mouth disease of livestock, a disease of potentially grave importance to Australia. The possibility of its introduction from overseas with consequent heavy stock losses must not be overlooked. Plans to combat outbreaks were submitted to the meetings.

At the July, 1953, meeting the Council accepted a proposal by the Standing Committee on Agriculture that the Standing Committee should meet in special sessions to review the effectiveness of co-ordination of agricultural research and extension work.

Food and Agriculture Organization.

The State F.A.O. Committee continued to meet and maintained liaison with the National F.A.O. Committee and, through it, with Rome Headquarters of the Food and Agriculture Organization of the United Nations. The State Committee and the Department continued to support F.A.O.'s expanded programme of technical assistance to under-developed countries. The Department assisted in the training of visiting agricultural students and officers of the Governments of many Asian countries.

Wheat Marketing and Stabilisation.

The 1948 Wheat Stabilisation Plan expired in September, 1953. By 30th June, 1954, no agreement had been reached on a new stabilisation plan to replace it. When it became apparent that agreement on new stabilisation proposals would not be reached prior to the expiry of the 1948 Scheme, the introduction of an orderly marketing plan was considered so as to avoid chaotic marketing and to ensure that Australia could meet her commitments under the 1953 International Wheat Agreement.

A marketing plan covering the three seasons 1953-54 to 1955-56 was subsequently agreed upon by the Commonwealth and all State Governments. This scheme, now operating, provides that all wheat marketed commercially during this period shall be handled by the Australian Wheat Board and that local sales shall be made at an agreed price on a basis determined and approved by all State Governments.

A new International Wheat Agreement was ratified by Australia late in 1953 and has been effective since 1st August, 1953. The Agreement covers the three-year period to 31st July, 1956. Australia's quota is 48,000,000 bushels annually but owing to several importers' failure to ratify the Agreement this quota will have to be reduced slightly. Unlike 1949, the United Kingdom, the world's largest wheat importer, is not a party to the new Agreement.

Although Australia was without a wheat stabilisation scheme at 30th June, 1954, there was hope that an agreement on a plan covering the five seasons from 1953-54 would be reached and implemented with the approval of wheatgrowers.

Expenditure.

The net expenditure from Consolidated Revenue Fund on investigational, educational and associated administrative activities during the year ended 30th June, 1954, amounted to £1,323,062. This figure does not include the expenditure on cattle tick control, £548,082 (£494,757 provided by the State and £53,325 contributed by the Commonwealth); the administration of the Government Grain Elevators, £404,809 gross (revenue £728,154); nor the Botanic Gardens, Domain and Centennial Park, £125,789 gross (receipts £6,148).

Certain revenues collected by the Department and amounting to £472,613 3s. 1d., exclusive of the revenue and receipts of the undertakings mentioned in the preceding paragraph, have been deducted from the gross expenditure to arrive at the net £1,323,062. In addition the Departmental expenditure from Loan funds was £145,447.

Details of the accounts of the Department, including the numerous Special Deposits Accounts, opened with the Treasury in terms of the Special Deposits Act of 1911, are presented in the *Appendix*.

Botanic Gardens and Sydney Domain Trust.

The Trustees of the Botanic Gardens and Domain held one meeting.

Farm Cove in the Sydney Domain was selected as the place where, on 3rd February, 1954, Her Majesty Queen Elizabeth II and His Royal Highness the Duke of Edinburgh landed in Australia. Subsequently the Royal Progress was through the Botanic Gardens into the City.

Large crowds gathered in the Gardens and Domain prepared specially for the occasion, to give a loyal welcome to the Royal Party. Band concerts were held in the Domain and an opportunity was afforded the public to view an evening fireworks display from the foreshores. The Trustees are considering a proposal that a suitable monument be erected on the landing site.

Requests continued to be received from organisations representing sectional interests, for the temporary or permanent alienation of portions of the Sydney Domain for purposes other than those related to its full and free use by the public. Protests against such encroachments were received from other organisations and individuals. The Trustees pursued their consistent policy of preserving the area for the purposes for which it was originally dedicated.

A formal objection was lodged by the Trustees against the proposed encroachment on areas under their control by an express road for which the City of Sydney Planning Scheme provides.

The lessee of the Domain Refreshment Room was granted a further extension of lease for three years.

Farrer Memorial Trust.

The Trustees of the Farrer Memorial Research Scholarship Fund held the Annual and one ordinary meeting.

The Annual Farrer Memorial Oration was given by Dr. A. T. Pugsley, Director of the Agricultural Research Institute of the N.S.W. Department of Agriculture, former Research Officer of the Waite Agricultural Research Institute, Adelaide. Dr. Pugsley was presented with the Farrer Memorial Medal for 1953, in recognition of his distinguished service in agricultural science, and delivered the Oration on 14th July, 1953, at the Annual Conference of the Agricultural Bureau of New South Wales at Hawkesbury Agricultural College. Dr. Pugsley has made significant contributions to plant pathology and genetics. His special interests relate to the development of disease resistant crops. The Oration was "Genetics in the Service of Agriculture". The text was subsequently published in the September, 1953, *Agricultural Gazette of New South Wales*.

Since the last Farrer Memorial Scholar, Mr. F. W. Hely, completed his studies and returned to Australia in January, 1953, no subsequent appointment has been made. Income from investments is accumulating, to provide funds for future award of the Scholarship.

McGarvie Smith Institute.

The Institute's new laboratories at Ingleburn are complete, and producing vaccines for sale. In addition to anthrax vaccine, which has been the Institute's main product, an increasing range of other veterinary vaccines is now being prepared.

In accordance with the McGarvie Smith Institute Incorporation Act, 1928, the profits from sale of the vaccines are applied to the promotion and advancement of veterinary education and research.

Agricultural Regions.

The policy of decentralising the administration and direction of extension and regulatory services of the Department was continued. A third Agricultural Region was established, the Western Region with headquarters at Orange.

A North-Western Advisory Committee has been appointed, with headquarters at Gunnedah, in anticipation of ultimate establishment of a North-Western Region.

Consideration is being given to the establishment of a South Coast and Tablelands Region. Establishment of a South-Western Region, to include the Murrumbidgee Irrigation Areas and others on the New South Wales side of the Murray, has also been discussed.

It is conceived that there will in due course be ten Agricultural Regions in the Department's organisational scheme. One of the critical limiting factors affecting expansion of the scheme at present is the rate of availability of trained personnel.

In the three Regions so far established all Departmental officers on extension or regulatory duties, with the exceptions of veterinary officers and officers stationed at an Agricultural College or Experiment Farm/Station, are members of the Regional Service. They are responsible directly to the respective Regional Supervisor though they remain officers of their respective Division, i.e., Plant Industry, Animal Industry, Horticulture, Dairy, Science Services, or Information and Extension Services, as the case may be.

The individual officer's advisory service is not limited by the field of the particular Division from which he stems. The code of operations requires that each officer shall "advise within his competence" on all agricultural matters, be they concerned with crops, pastures, livestock, dairying, plant diseases or pests.

Action has been taken where appropriate to decentralise within each Region certain groupings of officers. Improved decentralisation of staff within the various Regions has contributed a saving of travelling time, and also increased the effective contacts between local farmers and the Department's advisory services.

The Advisory Committee appointed by the Minister, for each Region, has met at approximate three-month intervals and each Committee has submitted advice of interest and value to the Department.

Regional staff office accommodation is at present a problem but improvements are in hand. Increased staffing in those parts of the State within the Regions is illustrated by the fact that whereas the total was 46, prior to formation of the

Regions, it was 70 at 30th June, 1954. The total of 70 comprises Regional Supervisors (3), Agronomists (13), Dairy Officers (16), Fruit Officers (5), Publicity Officers (3), Entomologists (2), Field Assistants (3) and Office Assistants (25).

Extension Aids equipment has also increased manifold, as indicated under "Division of Information and Extension Services".

Co-ordinated Extension Services.

This scheme was inaugurated a little earlier than the first Region. It is operating effectively within each Region as well as elsewhere. District Agronomists are the "District Co-ordinators", co-ordinating the extension activities of field officers of the co-operating bodies—the Department of Agriculture, the New South Wales Soil Conservation Service, the Rural Bank of New South Wales and the New South Wales Milk Board.

Approximately 220 field officers of these institutions have co-operated to improve and extend the agricultural advisory services available to primary producers.

Agricultural Extension Grant.

Many projects aimed at improving efficiency in the agricultural and livestock industries of the State are being implemented under the Agricultural Extension Grant scheme whereby the Commonwealth Government is making finance available to the States to supplement their extension services. This State's allocation is £50,000 annually.

Projects already approved include demonstrations of improved pasture practices, insect and weed control, feeding of livestock, provision of extension aid equipment and library books; mobile schools of mechanisation; appointments of a fruit packing instructor, editorial assistants, an Italian extension officer in the Murrumbidgee Irrigation Areas, and field assistants; orchard demonstrations of spraying, soil fertility maintenance, and lay-out; and the granting of cadetships at the University and Agricultural Colleges for the purpose of relieving the acute shortage of trained technical officers in the Department of Agriculture.

Country Abattoirs.

The numbers of stock slaughtered at the Goulburn and Wagga Abattoirs were substantially in excess of those for the previous year. During one week in February, 1954, the Goulburn Abattoir had a record slaughtering of 4,838 sheep, 717 cattle, 55 calves and 89 pigs.

Construction of the Dubbo Abattoirs progressed such that operations will commence there in August, in time for the fat lamb season.

For Gunnedah Country Killing Works a railway siding and cottages have been completed. Tenders were let for the amenities and administration block. Construction has commenced.

Wheat Handling.

The quantity of wheat received into the Elevator System during the 1953-54 season amounted to 45,359,699 bushels. In addition, a small quantity of premium wheat, received at "Owner's risk" from bulk trucks loaded at country stations where silo or bulkhead facilities are not available, was delivered straight through the terminal elevator to the mills concerned.

At least 87 per cent. of the total wheat delivered by wheat-growers last harvest was handled in bulk.

To meet the emergency of a heavy carry-over of wheat, urgent action has been taken to provide an additional thirteen million bushels of bulk wheat storage.

In addition, the sub-terminals at Junee, Parkes and Werri Creek are each being extended by a further one and a half millions bushels, making the total capacity, of each, four and a half million bushels. It is anticipated that these additions and the sub-terminal at Temora will be ready for the 1954-55 harvest.

Cattle Tick Eradication.

Seasonal conditions were very unfavourable for the implementation of the Board of Tick Control's policy in the quarantine areas. Until February, the major portion of the area was affected by severe drought and treatments of stock could be insisted upon only in areas where seasonal conditions were more favourable.

One of the worst floods in the history of the district occurred towards the end of February. This again dislocated the activities of the Tick Staff, but it can be stated that throughout the drought and the flood the Board and the Department showed the stock owners every consideration.

Stock losses in the Tick Quarantine Area from the flood totalled 5,187 cattle, 60 horses, and 931 pigs. The cyclone and flood extensively damaged the quarantine boundary fences, but prompt action by the staff prevented any major breakthrough of cattle into clean country. Considerable attention has been paid to repair and renewal of quarantine boundary fences. Over fifty miles of new fencing was erected.

Two new outbreaks of tick fever were recorded. One was in the Tweed Quarantine Area and one in the Bangalow Section of the Richmond Quarantine Section. The former outbreak arose from the illegal introduction of a bull from Queensland carrying pathogenic ticks.

Since 1937, tick eradication work in this State has cost more than £6 million, of which the New South Wales Government has contributed almost £5 million and the Commonwealth £1 million. Following protracted negotiations, the Commonwealth Government has agreed to contribute the sum of £820,000 towards the cattle tick eradication campaign to be undertaken in the cattle tick areas west of the Richmond Range and in the Kyogle area, beginning in January, 1956. The Commonwealth will review its contribution after three years.



Some 250 western farmers attended this "bulk handling of wheat, and farm storage of grain" field session at Lachlan Convention of the Agricultural Bureau.

Travelling Stock Reserves.

A further 540 applications for revocation of parts or the whole of Travelling Stock Reserves were received during the year and 156 Reserves were investigated in cases where Pasture Protection Boards had refused to agree to revocation action.

Meat Inspection Service.

The Meat Inspection Service continued to function effectively, though some difficulty was experienced in obtaining sufficient men suitable as meat inspectors. At 30th June, 1954, there were eleven vacancies.

An intensive campaign of retail butcher shops resulted in 2,419 inspections, and more careful observation of the Meat Industry Act by butchers, particularly in regard to lamb branding and the introduction of meat into the Metropolitan Abattoir Area. A marked improvement of hygiene has been noted in many shops.

A policy regarding licensed slaughter houses in the outer metropolitan area has been defined and these slaughter houses will be permitted to continue subject to the premises being brought to an approved standard and the provision of facilities for more stringent inspection of all animals slaughtered. Rebuilding or renovation of these slaughter houses is progressing and should be complete by the end of 1954.

Flood Relief.

The disastrous February floods, affecting coastal districts from the Hawkesbury River to the Tweed, resulted in 852 applications by primary producers for Flood Relief. These claims were investigated by field officers of the Department, and £65,805 was paid out in grants.

Legal and Registration Branch.

Legislation.

(The following legislation was enacted.)

Cattle Slaughtering and Diseased Animals' Meat (Amendment) Act, 1953.—This Act enables the councils in municipalities and shires, where it is not expedient for the council to set up a central abattoir, to enter into agreements with the proprietors of existing works for the use of such works as the central abattoir. Such agreements are to be subject to the Minister's approval but when approved the same restrictions apply to the sale of meat in the council's area as apply under the Local Government Act in the case of a council abattoir.

Wheat Marketing (Amendment) Act, 1953.—This Act was complementary to legislation passed by the other States and the Commonwealth, and gave statutory authority for the marketing of wheat through the Australian Wheat Board for a further three years and laid down a new basis for determining the home consumption price of wheat.

Regulations, Proclamations, etc.

Twenty-five Proclamations, fifteen Regulations and thirty-seven Notifications were published in the *Government Gazette* to implement Acts administered by the Department.

Agricultural Holdings Act, 1941.

Awards were made in four disputes referred to arbitration on the question of whether tenants were cultivating holdings according to the rules of good husbandry.

Prosecutions.

Informations prepared for prosecutions under various Acts number 116 as against 182 in 1952-53, the decrease being due to fewer prosecutions for failure to comply with the Fruit Fly and Codling Moth Proclamations.

As usual, the main offences were "topping" fruit and branding banana cases with a misdescription of the grade, in contravention of the Plant Diseases Act, 1924; and attempting to sell diseased stock, failing to notify the presence of disease in stock and failing to erect stock-proof fencing, in contravention of the Stock Diseases Act, 1923-1934. A number of prosecutions was also taken for failing to brand lamb in accordance with the Meat Industry Act, 1915-1952.

Farm Produce Agents.

Prosecutions were launched against three Farm Produce Agents for failing to issue dockets, the Department being successful in two of them. The docket system was extended to the sale of vegetables as well as fruit and it is considered that as a result of the recent amendments to the Act and Regulations the Department is in a better position to police the docket system effectively.

A prosecution was also taken to test the validity of the Act in regard to 10 per cent. commission being charged by agents on interstate farm produce. The agents challenged the validity of the Act so far as it extended to interstate transactions as being obnoxious to section 92 of the Commonwealth Constitution and the matter was moved into the High Court. The decision of the High Court is now being awaited.

Registrations.

The registrations effected during the current financial year as compared with the previous year are tabulated:—

	1952-53	1953-54
Apiary Registrations	3,330	3,897
Potato Licenses	2,437	2,070
Stock Foods	636	707
Stock Medicines	1,076	1,179
Pest Destroyers	760	791
Sheep Brands	2,915	2,364
Sheep Earmarks	3,049	2,483
Large Stock Brands	2,412	2,095
Fertilizers	317	367
Farm Produce Agents	305	309
Veterinary Surgeons	334	353

Veterinary Surgeons Board.

Ten meetings were held by the Board. Matters dealt with consisted mainly of the admission, removal and restoration of names to the Register of Veterinary Surgeons. Several complaints alleging unethical conduct by Veterinary Surgeons and unlawful practice by unregistered persons were investigated.

New Regulations under the Veterinary Surgeons Act, 1923-1952, governing all aspects of advertising by Veterinary Surgeons, came into operation in March, 1954.

The prescribed examination for veterinary graduates of overseas Universities was held in September, 1953, for the second time. Six of the nine examinees were successful and were subsequently granted registration.

Personnel Section.

The system of Departmental traineeships in Agriculture and Veterinary Science tenable at the University of Sydney, in Wool Technology at the New South Wales University of Technology, and cadetships in Diploma Courses at Hawkesbury and Wagga Agricultural Colleges, continued.

In-service training of office personnel continued through Public Service classes in shorthand-writing and typing at Technical Colleges in metropolitan and country areas. Departmental tutorial classes were conducted for clerical and field officers preparing for grade examinations.

Study leave concessions granted by the Public Service Board were availed of by officers attending University and Technical College courses.

Accommodation for married country officers remained a problem. Close liaison was maintained with the New South Wales Government Real Estate Office, and in several instances suitable residences were allocated to country staff.

The expansion of the Department and extension of the policy of decentralisation has resulted in increased demands for office accommodation in various country centres. Plans have been prepared for the erection of Government Offices at Wagga which will include accommodation for the Regional staff.

Staff Changes.

Appointments.—Dr. A. T. Pugsley appointed Director, Agricultural Research Institute, Wagga; Messrs. J. F. Macadam to District Veterinary Officer, Newcastle; S. Wise to Pastures Protection Officer; J. I. Marrott to Chief Clerk; C. W. Wearne to Personnel Officer; C. A. E. Kiel to Senior Inspector; C. C. Blumer to Deputy Chief, Division of Animal Industry; R. M. Watts to Chairman, Board of Tick Control; J. N. Henry to Principal Veterinary Officer; E. H. Headley to Special Dairy Officer; G. J. Fisher to District Veterinary Officer, Cumberland; R. H. R. Falk to District Veterinary Officer, Cootamundra; D. R. Stark to Field Officer; R. A. Hall to Principal Veterinary Officer; E. C. Whittaker to Special Fruit Officer; L. J. Green to Principal Agronomist (Extension); N. K. Golding to Assistant Principal Veterinary Officer; H. E. R. Beattie to Special Veterinary Research Officer; C. J. T. Hawkins to Special Livestock Officer (Sheep and Wool).

Retirements.—Messrs. H. Luckman, First Clerk; E. L. Carpenter, Assistant Inspector of Stock; J. R. Rengger, Laboratory Assistant; Miss M. J. Mulvaney, Shorthand-writer and Typist; Messrs. G. C. Bartlett, Senior Agronomist; H. Bartlett, Principal Agronomist (Extension); W. C. Robertson, Inspector of Stock; R. W. Marsh, Senior Dairy Officer, H. Shorten, Foreman, Botanic Gardens; A. Fairweather, Overseer, Government Grain Elevators; Miss A. M. Casey, Clerk; A. Reilly, Shorthand-writer and Typist; Messrs. S. L. Black, District Veterinary Officer; J. V. Dolahenty, Senior Clerk; G. T. Dawson, Special Agronomist; W. D. Kerle, Special Agronomist.

Resignations.—Messrs. R. C. Denyer, District Veterinary Officer; J. O. Smith, Lecturer, Hawkesbury Agricultural College; H. G. Grant, Senior Foreman, Botanic Gardens; W. F. Owen, Economics Research Officer; A. A. Hackshall, Meat Inspector; B. F. Atkins, Lecturer, Wagga Agricultural College; Dr. F. H. W. Morley, Special Veterinary Research Officer.

Deaths.—It is regretted that the deaths of the following officers and employees occurred: Messrs. P. H. Bunton, Garden Labourer; G. A. Saunders, Extension Officer (Radio); C. C. Wright, Senior Inspector; A. R. Atkinson, Dairy Officer; F. H. Martin, Butter Graders' Assistant; M. L. Frost, Meat Inspector; A. C. Hopkins, Clerk; J. G. Fleet, Meat Inspector; H. F. Cochrane, Meat Inspector.

Additional Officers Overseas.—Mr. L. G. Williams, Veterinary Officer, is in the United States under a Rotary Foundation Fellowship.

Number of Staff at 30th June, 1954.

	Public Service Board.	Minis- terial.	Total.
Central Administration	199	1	200
Division of Information and Extension Services	28	...	28
Division of Marketing and Agricultural Economics	28	...	28
Division of Science Services	93	...	93
Division of Plant Industry	138	...	138
Division of Dairying	150	...	150
Division of Horticulture	123	1	124
Division of Animal Industry—			
Head and District Offices	156	8	164
Meat Inspection Services	112	...	112
Queensland Border	38	2	40
Tick Quarantine Areas	29	508	537
Hawkesbury Agricultural College	62	59	121
Wagga Agricultural College	27	42	69
Experiment Farms and Nurseries	103	208	311
Botanic Gardens	135	3	138
Grain Elevators	84	123	207
Total	1,505	955	2,460

Architect's Branch.

With the exception of the buildings, fencing, etc., for the beef cattle stud, and additions to the cottage occupied by the Director of the Agricultural Research Institute, at Wagga, and the purchase of land at Alstonville for the Tropical Fruits

Research Station, Loan expenditures were confined to continuance and/or finalising of contracts which were under way in the previous financial year.

Works completed during the year comprised: the Memorial Library at the Hawkesbury Agricultural College; cottage additions at Wagga Agricultural College; and fencing at Glenfield Veterinary Research Station.

Works still proceeding include the new dairy produce factory and electrical extensions at the Hawkesbury Agricultural College; the Wagga Agricultural Research Institute; stud cattle buildings, fencing, water supply, electrical extensions and town water supply at the Wagga Agricultural College and Experiment Station; installation of electricity at Temora Experiment Farm; a glass house at Yanco Experiment Farm; new buildings at Coomealla Research Station; and installation of electricity and dairy equipment in the Macquarie Fields Area of the Glenfield Veterinary Research Station.

Maintenance work consisted of painting and repairs to cottages and farm buildings at Leeton and Bathurst Experiment Farms, Glenfield Veterinary Research Station, Seven Hills Poultry Experiment Station and Queensland Border; and desilting of tanks on the Public Watering Places in the Western Division.

Extension Service.—Plans representing buildings to the value of £345,775 were supplied to farmers. Many farmer inquiries concerning building problems were attended to by letter or by personal interviews.

Pastures Protection Section.

Mr. W. J. Smith retired from the position of Field Officer on 27th May, 1953, and Mr. D. R. Stark was appointed on 26th October, 1953. It was immediately necessary for the field officer to undertake organisational work associated with the plague locust campaign.

Plague Locust Activities.—The outstanding activities of this Section arose from extensive outbreaks of plague locusts. Practically the whole of the Central Division and the south-western portion of the State were infested. Extensive egg laying took place during the outbreak, and a further severe outbreak is expected during the spring of 1954.

The Entomological Branch report includes more detail, but the following quantities of insecticides were supplied to Pastures Protection Boards up to 30th June, for distribution to landholders:—

B.H.C. 20 per cent. dust, 23,856 lb.
B.H.C. dispersible powder, 29,792 lb.
B.H.C. emulsion, 53,960 gals.
B.H.C. 1 per cent. Gamma Isomer in Sovacide, 968 gals.
B.H.C. 10 per cent. Gamma Isomer in Sovacide, 1,848 gals.
Aldrin, 2,574 gals.
Toxaphene, 3,303 gals.
Distillate, 10,000 gals.



Winged locust (*Chortoicetes terminifera*) swarms were attracted by green lawns but B.H.C. inhibited feeding activity and yielded spectacular kills. The outbreak of Australian Plague Locusts was the most important problem of the Entomological Branch and Pastures Protection Boards this year.

Under the Noxious Insects Act, the cost is recoverable from individual landholders in those Pastures Protection Board districts declared for the purpose, and forty-three Pastures Protection Boards, in which areas it was obligatory to make and levy the special rate proclaimed, were specified in accordance with Section 10 of the Act. However, the New South Wales Government made a grant of £75,000 towards the cost of the campaign.

The Pastures Protection Officer and the field officer of this Section were heavily engaged throughout the whole of the campaign. The Pastures Protection Officer organised supplies of insecticides for distribution to the various Pasture Protection Boards, and the field officer was engaged in the country on organising duties.

Revocation or Curtailment of Travelling Stock Reserves.—As soon as possible, the new field officer began inspecting Travelling Stock Reserves for which private individuals had applied for settlement purposes, but to the revocation of which the Pastures Protection Boards had not agreed. These cases had been set aside by the Minister for inspection by the field officer.

The Pastures Protection (Amendment) Act, 1951, provides for Travelling Stock Reserves or parts thereof to be withdrawn from the control of the Pastures Protection Boards on the recommendation of the Minister of this Department. Applications for revocation of parts or the whole of Travelling Stock Reserves handled from 7th December, 1951, to 30th June, 1953, totalled 819, whilst during the past year a further 540 cases were received. Cases dealt with to 30th June, 1954, are summarised:—

		Reserves.
Boards not agreeable to revoke, cases awaiting investigation	462	
Boards agreeable to revoke or part revoke	345	
Awaiting replies from Boards	88	
Boards not agreeable: investigations sustain Board's decisions	81	
Boards not agreeable: investigation shows revocation could be made—awaiting reconsideration by Boards	31	
Lands Department advising consent of Pastures Protection Board to revocation and seeking recommendation from Minister for Agriculture	338	
Reference to Lands Department for Land Board inquiry	5	
Referred to Lands Department for revocation Land Board Inquiries completed	4	
	5	
Total	1,359	

The following figures indicate the position in regard to Reserves during the years ended 30th June, 1953, and 30th June, 1954:—

Period.	No. of Reserve applications received.	No. of Reserve applications rejected by Boards.	No. of Reserves investigated.
1-7-1952 to 30-6-1953	614	239	17
1-7-1953 to 30-6-1954	540	288	156

The new field officer has made a very big impact upon the number of Reserves investigated but even so, to reduce the total number of Reserves awaiting investigation is proving very difficult.

Dingo Destruction Boards.—The proclamation constituting the Pilliga Scrub and North-West Dingo Destruction District, published 29th March, 1946, was revoked by Proclamation published 26th February, 1954. The Board achieved its objective of completely destroying dingoes throughout its area.

The Pastures Protection Officer discussed with each of the four remaining active Dingo Destruction Boards a proposal that Government aid be on the basis of a percentage of each Board's rate income. A proposal was accepted that the aid be on the basis of up to 50 per cent. of each Board's rate income each year, subject to the Pastures Protection Act being amended to increase the maximum rate that may be levied for Dingo Destruction Board purposes from 90 per cent. of $\frac{1}{2}$ d. to 95 per cent. of $\frac{1}{2}$ d. per acre of ratable land within the Dingo Destruction Board district.

Public Watering Places.—Contract Works.—Major works carried out by contract included the desilting of six tanks, averaging approximately 5,000 cubic yards of silt removed, two new bores equipped with two 5,000-gallon storage tanks, a 10-ft. wheel windmill, 152 feet of troughing, and fencing, etc.; the renovation of the pumping and watering equipment on four Public Watering

Places in the Milparinka and Hillston Districts, the storage tanks being cement-lined inside and out and new concrete troughing erected.

Maintenance Work.—The Day Labour Gang stationed at Cobar is now fully staffed. It worked on Public Watering Places in the Broken Hill, Wilcannia, Wanaaring, Bourke, Brewarrina, Walgett North and Cobar Pastures Protection Board districts.

The maintenance man employed by Bourke Pastures Protection Board also carried out maintenance on windmills and minor repairs in Brewarrina and Wanaaring districts.

In January of 1954, Mr. W. Brown was appointed Supervisor of Public Watering Places following the transfer of Mr. D. Stark. He is attached to the Departmental Architect's Branch.

Leases of Public Watering Places in Western Division.—Leases of Public Watering Places in the Balranald, Bourke and Wanaaring Pastures Protection districts expired and the Minister has approved of these Boards granting leases over sixty-three Public Watering Places in their districts.

Public Watering Places:

	Year ended 30/6/53	Year ended 30/6/54
Revoked	5	10
Established	9	3
Revoked and re-established as amended area	5	10

Soldier Settlement Arcas.—Arrangements continued to be made for Pastures Protection Boards to report upon the rabbit infestation of properties, brought under notice by the Department of Lands, which are in the process of being taken over for Soldier Settlement.

Live Hares.—The Prevention of Cruelty to Animals Act was amended to prohibit live hare coursing and, in consequence, Regulations under the Pastures Protection Act were amended to delete the provision for permission to keep live hares.

Biometrical Branch.

This Branch specialises in the design of investigational work and mathematical-statistical examination of the experimental results, to improve the efficiency of research and experimentation. Advice on the design, analysis and interpretation of experiments was given to members of the agronomy, plant breeding, animal breeding, animal nutrition and other sections.

Advice in respect of design was concerned with such matters as choice of fertilisers and rates of application for an experiment with hybrid maize; and methods of housing and allotment of animals to treatment groups in a pig-feeding experiment. Other matters which received attention included the selection of sites and size of plot for field work with crops and pastures; selection of animals for experimentation; experimental designs proper; border-effect in small cereal plots; sampling for weight of forage and for moisture-determination in pasture work; ancillary measurements such as initial weight of animals; and soil-sampling in the field as related to chemical laboratory methods.

Data from a sown-pasture fertiliser experiment at Glen Innes were reported on in detail. Data from sampling for egg-production and for egg-weight in poultry were examined for adequacy of sampling.

Some progress was made with use of regression on previous forecasts for wheat crop-forecasting.

The use of strips and tile designs was advocated for plantings in new fruit experimental areas at Gosford and Yanco.

The Senior Biometrician visited the Experiment Stations and Farms for on-the-spot discussion of experimental work currently being undertaken, and to advise on ways in which experimental designs and techniques might be improved.

Extra-Departmental activities again included Agricultural Biometry lectures at Sydney University by the Assistant Biometrician.

Collaboration with officers of the Forestry Commission continued, in developing sampling-plans for estimation of timber-volumes in State Forests.

GOVERNMENT GRAIN ELEVATORS.

Movement of 1951-1952 Wheat Harvest—No. 15 Pool.—At 1st July, 1953, the Elevator System held 267,469 bushels from this harvest, but all has since been cleared.

Movement of 1952-1953 Wheat Harvest—No. 16 Pool.—The total from this Pool stored at 1st July, 1953, was 19,768,032 bushels: 13,774,980 in country storages and 5,993,052 at seaboard terminals. Lack of shipping retarded clearance, and when the new harvest was due, approximately 1,000,000 bushels were held in the country and 6,000,000 at Sydney terminal. All country sites have now been cleared of that wheat. Movement from Sydney terminal has been accelerated by the Australian Wheat Board's policy requiring all metropolitan mills

to accept No. 16 Pool wheat as a proportion of their weekly requirements. All metropolitan produce merchants' orders in the same area are being supplied entirely from No. 16 Pool.

Receipt of 1953-1954 Harvest—No. 17 Pool.—Wheat received into the Elevator System totalled 45,359,699 bushels. The wheat was harvested under good dry conditions, subsequently reflected also in the generally good keeping quality.

A small quantity of premium wheat was received in the terminals from bulk trucks direct loaded at country stations not yet equipped for bulk storage. Such wheat, received at "owner's risk", was delivered straight through the terminals to the mills concerned.

Bulk trucks were again made available at non-silo stations in the northern, premium area, and approximately 900,000 bushels were thus moved in bulk to the mills.

Australian Wheat Board figures indicate that 87 per cent. of all wheat delivered was handled in bulk. This included wheat received from bulk trucks at flour mills or loaded into bulk trucks by the Australian Wheat Board's country agents.

The Temora sub-terminal was brought into use for the first time. With similar units operating at Werris Creek and Junee, the value of these installations in facilitating prompt handling of large quantities of wheat in limited time was again emphasised. The facilities also saved farmers considerable expense on cornsacks. Because of the large quantity of 1952-53 wheat held in Sydney terminal, it would not have been possible without the three sub-terminals to handle all wheat being delivered, as these figures indicate:—

Werris Creek:

	Bushels
Received direct from farmers	643,193
In rail trucks from other silos	1,893,989
	<u>2,537,182</u>

Junee:

In rail trucks from other silos	1,835,418
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Temora:

In rail trucks from other silos	1,379,337
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Apart from the sub-terminals' value, 66,528 bushels were trucked to Forbes silos from other silos in the vicinity.

Harvesting operations proceeded smoothly, with Railways Department co-operating fully in the movement. Regular supply of trucks at all sites was sometimes difficult to maintain when deliveries of northern areas' wheat continued whilst demands for trucks were heavy elsewhere. At 30th June, 1954, the movement of wheat from country silos and bulkheads is somewhat restricted, reflecting the Wheat Board's difficulties in arranging overseas sales of wheat and the fact that all mills are not working to maximum capacity since the overseas demand for flour has also weakened. Indications are that there will still be a large carryover when the 1954-1955 harvest is due.

There were 220 sites in operation to receive wheat direct from farmers:—

Silos	181
Non-Silo Bulkheads	36
Separate Bulkheads at Silo Stations	2
Werris Creek Sub-Terminal	1

At forty-three silo stations bulkheads were also operated, in conjunction with the silos.

Movement of 1953-1954 Season Wheat:—

	Bushels	Bushels
Country Elevators and Bulkheads:		
Receipts		44,495,256
Deliveries to Flour Mills	9,221,768	
Deliveries to Sydney Terminal ..	4,968,500	
Deliveries to Newcastle Terminal	2,165,800	
Deliveries to Werris Creek Sub-Terminal	1,893,989	
Deliveries to Junee Sub-Terminal	1,838,469	
Deliveries to Temora Sub-Terminal	1,379,337	
Deliveries to Forbes Silos	66,528	
Deliveries to Stock Feed (road)	171,650	
	<u>21,706,041</u>	
Stocks at 30th June, 1954		22,789,215

	Bushels	Bushels
Werris Creek Sub-Terminal:		
Receipts from Farmers	643,193	
Receipts from Country Elevators	1,893,989	
	<u>2,537,182</u>	
Deliveries to Mills	684,512	
Deliveries to Newcastle Terminal	678,820	
	<u>1,363,332</u>	
Stocks at 30th June, 1954		1,173,850

Junee Sub-Terminal:

Receipts from Country Elevators		1,838,469
Temora Sub-Terminal:		
Receipts from Country Elevators		1,379,337
Forbes Silos (Temporarily used as Sub-Terminal):		
Receipts from Farmers	221,649	
Receipts from Country Elevators	66,528	
	<u>288,177</u>	
Deliveries to Sydney Terminal ..	4,859	
Deliveries to Stock Feed (road)	150	
	<u>5,009</u>	
Stocks at 30th June, 1954 ..		283,168

Sydney Terminal Elevator:

Receipts (including 43,345 bushels Non-Silo Wheat at Owner's Risk).	5,016,703
Deliveries	1,828,178
Stocks at 30th June, 1954 ..	3,188,525

Newcastle Terminal Elevator:

Receipts	2,844,621
Deliveries	2,423,613
Stocks at 30th June, 1954 ..	421,008

Total Stocks at 30th June, 1954:

Country Elevators and Bulkheads	22,789,215
Sub-Terminals	4,674,824
Sydney Terminal	3,188,525
Newcastle Terminal	421,008
	<u>31,073,572</u>

Bulk Wheat Loadings at Terminal Elevators: Twenty-one ships loaded a total of 5,150,790 bushels at Sydney terminal, and eleven ships loaded 3,048,817 bushels at Newcastle terminal.

Construction of Additional Storage: Further progress has been made by the completion of the Temora and Parkes sub-terminals. The former was available for the first time during the 1953-54 season, whilst the latter is expected to be in service for the 1954-55 season.

Bulkheads at Emerald Hill and Garema were completed.

Arrangements have been made to increase storage capacity to meet the emergency resulting from inability to dispose of wheat overseas and the consequent heavy carryover in the silo system.

The sub-terminals at Junee, Werris Creek and Parkes will be extended so that each will hold four and a half million instead of three million as originally planned. The work is in progress, and all sites are expected to be ready to receive wheat to their full capacity from the 1954-55 harvest.

In addition, new storage units will be erected to other points. Contracts which will provide up to twelve and a half million bushels additional capacity have been let. The project includes Newcastle terminal elevator which will then have its capacity raised from 800,000 to 4,000,000 bushels.

The total additional storage capacity expected to be available for the coming season as compared with the 1953-1954 season is 20,000,000 bushels made up as under:—

	Bushels.
Parkes Sub-Terminal	3,000,000
Plus extension	1,500,000
Werris Creek Sub-Terminal	*1,500,000
Junee Sub-Terminal	*1,500,000
New Emergency Storage Units	12,500,000
	<u>20,000,000</u>

When the projects have been completed, the Grain Elevators will be capable of holding 72,000,000 bushels at one filling.

* Increase from 3,000,000 to 4,500,000.



This side-delivery rake (English style), raking lucerne into windrows, is in keeping with the intense interest in mechanised farming.

DIVISION OF PLANT INDUSTRY.

Mr. H. Bartlett, Principal Agronomist (Extension) and Mr. W. D. Kerle, Special Agronomist (Maize) retired.

Regional Conferences of the Division's district and Experiment Farm officers, held at Experiment Farms, directed particular attention to research and extension work which will produce the greatest benefit within a reasonable time. At all conferences it was accepted that work relating to pasture improvement and soil fertility uplift should have priority.

Agricultural Extension Grant.—The Division of Plant Industry is at present administering fifty-five projects approved under the Grant.

No less than 150 demonstrations have been established, and are in all districts except coastal dairying areas. They are demonstrating improved production practices relating to wheat, maize, linseed, rice, peanuts, potatoes and peas. Pasture management demonstrations include pasture establishment in the tablelands and irrigation areas, red clover rotations, superphosphate and minor element practices, red mite control and *Phalaris* seed production. Weed control demonstrations are an important part of the programme. Films on serrated tussock and skeleton weed control are being produced by contract.

Dairy Industry Extension Grant.—The value of demonstrations under this Grant has been progressive. Some have been established for five-six years. Since the end of the third year worthwhile achievements have been most notable. The more important agronomy demonstrations relate to pasture improvement and an uplift in soil fertility as a basis for improved dairy production.

Wheat.

The area harvested for grain was 3,470,000 acres, 768,000 more than the previous year, and the largest since 1949-50. Estimated production was 65,000,000 bushels, an average of 18.7 bushels per acre. It was the largest crop since 1949-50 and the seventh highest on record.

Over the past seven years the State has experienced five above-average seasons with an average yield of 19 bushels per acre, and for the seven-year period 17.5 bushels per acre. Compared with the pre-war average of 13 bushels per acre, this represents an increase of 34.6 per cent. Seasons have been responsible in part for this marked increase, but other important contributing factors are marked improvement in mechanisation, improved farming methods and the sowing of better varieties. Improved mechanisation has facilitated opportune work. Economic conditions have encouraged farmers to adopt wider crop rotation, thus reducing the drain on soil fertility. It seems likely that the average yield per acre will be maintained at a level 20 to 25 per cent. higher than before the war.

Grain Quality.—The quality of New South Wales f.a.q. wheat has been under criticism by the milling and baking industries. The gazettal, during March, 1954, of new and amended standards for flour and bread, underlines the question of improving the quality of wheat available to the milling trade.

The overall quality of wheat grown in New South Wales has not deteriorated. The valid complaint would be that the quality of our wheat has shown insufficient improvement to meet the changed requirements brought about by mechanical dough mixing and the industrial conditions governing the manufacture of bread. To meet these changed conditions, there is an urgent need for wheat quality to be improved.

Varieties.—The variety pattern in New South Wales has changed. The better quality wheats now occupy about 52 per cent. of the State wheat acreage. Farmers are conscious of the need to improve the quality of their product.

Wheat varieties recommended by the Department are now restricted to twelve, of which two are classified as strong flour, seven as medium strong flour and three as weak flour. The area sown to recommended and promising varieties is approximately 90 per cent., clearly indicating that farmers are following the Department's advice. Variety statistics for 1952-53, the latest available, show that the following are the most popular varieties:—Bencubbin, 38.35 per cent. of the acreage; Gabo, 15.82 per cent.; Kende, 7.23 per cent.; Charter, 5.36 per cent.

Of the new varieties under trial, Spica, a Queensland variety, is showing promise in the north-west, whilst Curlew and Brolga, bred at Temora Experiment Farm, gave excellent yields in southern and central districts. These, together with Javelin, all better quality wheats than Bencubbin, are now being tested at over forty centres.

Festival, a high quality wheat bred by the Department, is finding favour with northern growers. At the 1954 Royal Agricultural Show, Festival was awarded the Commonwealth championship for strong, white wheat. Millers purchased 302,340 bushels, for which they paid a premium of £21,836.

Wheat Diseases.—Some years have elapsed since stem rust assumed serious economic proportions, and under field conditions it has not been possible to assess the resistance of a number of recently released varieties to the new races of rust.

Root rot, take-all and foot rot were again very evident and accounted for more losses than all other diseases combined. None of the commercial varieties appears to be resistant. Root rot was most pronounced in crops sown on pasture ley land and frequently occurred as a secondary condition arising from frost damage.

The incidence of ball smut or bunt is increasing and although the over-all loss is not great, its presence is a warning that growers must not neglect seed treatment. Action has been

taken through district agronomists to remind farmers of the correct control measures. Now that a large percentage of the crop is handled in bulk, delivery of smutted parcels can seriously interfere with expeditious receipt of wheat.

Wheat Improvement.—The breeding and improvement programme was continued at Wagga Agricultural College, Temora, Condobolin and New England Experiment Farms. In addition, plant breeders' material was tested at a number of other Experiment Stations and on private farms in the wheat belt. Additional extension plots were commenced at Parkes and Quandialla.

The Wagga Agricultural Research Institute has assumed responsibility for the wheat improvement programme for the southern and central districts. The University of Sydney is to undertake the breeding work for northern districts.

The principal objective for southern districts is the breeding of varieties capable of a better quality flour as well as good yield. A backcrossing programme is proposed, to improve varieties such as Bencubbin and Quadrant.

The northern programme aims to breed for rust resistance, greater tolerance to cold damage, better straw quality, winter type wheats and durum wheats. The present grain quality position is sound and several advanced crossbreds show good quality characteristics.

Breeding for Disease Resistance.—The world rust nursery was continued at New England (Glen Innes) and Temora Experiment Farms. Two hundred lines selected at the former centre were sown. Rust incidence was negligible. Consequently selection for resistance was restricted. With glass-house facilities available at Wagga Agricultural College and New England Experiment Farm, more specific investigations for rust resistance will be possible.

Winter Wheats.—At Glen Innes a hand-sown block of over 2,000 lines of winter wheats was planted in February. From these, some 400 lines were selected for winteriness. Several winter lines sown in May gave yields comparable to standard spring varieties, and proved superior to the winter wheats Early Blackhull and Winter Miniflor.

Durums.—A leading canner is particularly interested in durum wheats for the production of a suitable type of semolina for the manufacture of macaroni. The durum programme advanced another stage and has shown promising results. Two lines, Aleppo x Palestine, and Joppa x Durity, proved outstanding, exhibiting a yield potential comparable to a number of leading varieties, and with qualities acceptable to the macaroni manufacturers. They are being seed increased, and also grown on a commercial scale in the north-west for yield and quality testing.

Wheat Introductions.—Some 1,600 introductions were tested at Glen Innes. Their quality was generally disappointing, indicating a high standard in our locally bred varieties.

Pasture Ley Experiments.—The value of a pasture ley period, as a means of increasing yield and grain quality, was amply demonstrated at Wagga Agricultural College and Experiment Station. Average yield of three wheat varieties increased from 7.4 bushels per acre to 28.4 bushels per acre. The improvement in protein content of Bencubbin was from 7.64 per cent. to 12.14 per cent. Quality of the protein also increased appreciably.

Intensity of Cropping Experiment.—Following the pasture ley period, grazing oats, in rotation with wheat, gave the best results in an intensity of cropping experiment at Wagga College. The wheat, grazing oat, fallow rotation, over a period of seven years, out-yielded all other treatments by twenty-six bushels, and in addition the oat provided winter grazing in three of the seven years.

Long-term Rotation Experiment.—Long-term rotation experiments approved for Condobolin and Temora Experiment Farms are expected to provide valuable data on soil fertility and grain quality.

Tillage Experiments.—The value of various implements for the treatment of wheat stubble and sub-surface tillage, is being investigated.

Extension Plots on Private Farms.—Extension plots conducted with farmers for winter cereal yield testing and demonstration purposes included fifty-four wheat variety trials.

Foundation Seed Production.—This is an important function of the Department, the source of high quality seed available to farmers producing Registered seed wheat.

Initial selections were made principally at Temora Experiment Farm for wheat, and at Wagga College for oats and barley. At Condobolin some wheat and oat varieties were selected. Stud bulk seed areas for the production of Foundation seed were sown at Condobolin, Trangie, Leeton and Cowra Experiment Farms. A small seed area was also sown at Tamworth Experiment Station.

Field Wheat Competitions.—Six divisional championships were conducted by the Royal Agricultural Society, compared to five in former years. The additional championship was conducted in the north-west, reflecting the farmers' keenness. These competitions are judged by Departmental officers. The question of featuring grain quality as a leading factor in crop competitions is under review.

Oats.

Oats are assuming increasing importance for winter grazing when pastures are growing slowly, and also as a grain fodder reserve. In the higher rainfall districts the practice of sowing oats in conjunction with the renovation of improved pastures is extending. With the increase of bulk storage facilities on farms, the trend is to conserve grain in preference to hay. In rotation with wheat and improved pastures, oats are particularly valuable, providing a winter feed when most needed. Approximately 54 per cent. of the area sown to oats is harvested for grain, 31 per cent. is used entirely for green fodder and grazing, and 15 per cent. is cut for hay.

Varieties.—No variety census was taken by the Government Statistician in 1953/54. However, the variety pattern has not materially changed except that Dale, Ballidu and Orient are increasing in popularity mainly at the expense of Belar and Fulghum. The former varieties are giving good results for grazing and grain production. The milling quality of their grain is inferior to Belar, and Orient is unsuitable for that purpose.

Oat Improvement.—Temora Experiment Farm's hybrid, Fulghum x Fulghum x Gidgee x Markton, is most promising. In the 1/40th acre trial plots at Temora it gave the extremely high yield of 130 bushels per acre. It has also shown to advantage for the past two years at Wagga College. It has a relatively short straw and satisfactorily resists lodging. The creamy coloured grain is attractive, moderately large and of good quality. As a grazing oat it is inferior to Fulghum, but is about equal to Dale or Belar.

It will be extensively tested and seed increased this year. In the event of favourable trials it will be named and submitted for registration, prior to release for general cultivation.

A progressive crossing programme was undertaken at Wagga College, including a number of backcrosses made with the objective of incorporating rust resistance. Sixty-four crosses were made at Wagga, four at Condobolin Experiment Farm and three at Temora Experiment Farm.

The introductions, Fulgrain 6 and Osage, are promising for grain production though they appear to fall short of requirements for grazing purposes. Victorgrain 4, another introduction which is still in the early testing stage, shows promise of being a better grazing type.

All promising crossbred material and introductions were thoroughly tested for grazing ability and recovery.

Barley.

The average Australian production of barley is approximately thirty-five million bushels, of which five million bushels are used for malting and two million bushels for other manufacturing purposes. By comparison with other States, barley occupies an unimportant position in N.S.W. Estimated area sown for all purposes was 45,000 acres, including grazing areas, feed grain and grain for malting.

Farmers show little interest in the growing of malting type barleys, largely because of marketing problems. Furthermore, few districts are suitable for high quality malting barley. At present maltsters prefer to draw their main supplies of malting barley from South Australia and Victoria where barley growing is firmly established.

Barley Improvement Programme.—The programme was restricted to testing of varieties and advanced lines. The leading malting type barley grown in Australia is Prior, occupying about 66 per cent. of the area, and is readily sought by maltsters. To replace Prior a variety would need similar physical, grain characters plus improved malting properties.

The 6-row barley crossbred, Abyssinian x Flynn, bred at Wagga College, has been accepted for registration and will be known as Ablyn. Arrangements are in hand to seed increase Ablyn. At present no seed is available for general distribution.

In a comparison with oats for grain production, trials at three Experiment Stations showed barley to be the more productive. At Trangie Experiment Station over a period of three years the average superiority in yield was 342 lb. per acre.

Rye.

A limited demand exists for rye flour, mainly by new Australians from Europe. As a grain crop, rye is inferior in yield to other cereals though it has a capacity to thrive under harsher conditions. The growing of rye in N.S.W. is restricted. It is grown mainly for erosion control in the drier districts and to supply winter grazing on the poorer soil types in colder districts and along the coast. Spectacular increase in acreage is not envisaged. However, strain trials and seed increase are proceeding at Condobolin and New England Experiment Farms.

Maize.

The 1953/54 season was most adverse for maize due to the spring and summer drought in most areas, accompanied by heavy black beetle damage, and to the north coast floods in February. State production of grain is estimated by the Division of Marketing and Agricultural Economics at 1,300,000 bushels from 34,000 acres, an average of 39.2 bushels per acre.

A new record yield for N.S.W. was established in this year's R.A.S. Field Maize Championship Competitions by a crop of Victory hybrid at Lower Portland, estimated to yield 170 bushels per acre. Other high yields were estimated at 165 bushels per acre for a crop of Emblem hybrid at Bodalla and 157 bushels per acre for another Emblem crop at Pambula.

About 50 per cent. of the N.S.W. maize acreage for grain is now estimated to be sown with hybrid seed.

District Yield Tests.—Approximately thirty hybrid maize grain trials and seven fodder trials were sown in the various maize-growing districts, but many were ruined by the black beetle damage or wiped out by the February floods. Results will be obtained from perhaps half of the trials. Some have already been harvested. The midseason hybrids developed at Grafton Experiment Farm continue to give good results.

Hybrid Maize Breeding Programmes.—Breeding continued at Grafton and New England Experiment Farms and Hawkesbury Agricultural College.

Now that midseason hybrids suitable for the central and south coast have been developed at Grafton Experiment Farm the most important projects at that Farm are the breeding of early to midseason types suitable for the coast north of Kempsey, and the improvement of the inbreds which make up the present late maturing commercial hybrids. Many improved lines are now on hand but a series of difficult seasons has impeded their testing. White grained hybrids also are being yield tested at Grafton Experiment Farm.

At New England Experiment Farm the most important new project is the development of a very early maturing hybrid suitable for the shortest season districts. This and other projects have been helped by material introduced from the very co-operative United States Department of Agriculture and other agencies in the U.S.A. Some of our own breeding material has also proved useful to United States workers. Material has also been exchanged with various countries in Africa.

Since Grafton and New England Experiment Farms are able to cater for all New South Wales maize maturity requirements the programme at Hawkesbury Agricultural College will be discontinued and replaced by a sweet sorghum improvement project. All maize breeding material of value is being transferred from Hawkesbury Agricultural College to Grafton Experiment Farm.

Hybrid Maize Foundation Seed Production.—The bad season resulted in very poor yields of Foundation seed from Grafton and New England Experiment Farms. At Grafton the February flood caused great damage, completely destroyed the mid-season Foundation seed areas, and delayed for another year the release of a mid-season hybrid for commercial production.

Three selected farmers obtained very good results in their first attempt at Foundation seed production. All produced seed of early maturing hybrids. Consequently, large supplies of Foundation seed of this maturity are now on hand for 1954 sowing. However, Foundation seed of late maturing hybrids will barely meet requirements.

Hybrid Maize Registered Seed Production.—Approximately 11,200 bushels of Registered hybrid maize seed is expected from this year's harvest as compared with 13,360 bushels obtained last year. The bad season is entirely to blame for the decrease. More than eighty growers intended to produce Registered seed, but only sixty-four were effective. Some were unable to sow because of dry weather. Others lost their entire areas through black beetles or floods.

The appointments of a seed certification officer at Kempsey and a field assistant at Lismore have relieved district agronomists of much work connected with hybrid maize seed production.

Maize Investigational Work, General.—Fertilizer and spacing trials with hybrid maize continued in several localities. Weedicide and seed treatment trials were also carried on. Results of most of those trials are promising.

Sweet Corn.

A pronounced drop occurred in the area of sweet corn sown by canning companies, but a swing back towards normal sowings is expected next season. About 300 bushels of Golden Cross Bantam seed were produced, and will be adequate for normal requirements. Good supplies of Foundation seed are on hand for sowing next season's hybrid seed areas.

The breeding programme at Yanco Experiment Farm was temporarily curtailed because the responsible agronomist was in Italy on a scholarship.

Fertiliser and spacing trials with sweet corn were continued at Yanco Experiment Farm and Hawkesbury Agricultural College. Nitrogenous fertilisers at higher rates have given good results. The trials must continue. Other miscellaneous work with sweet corn was carried on at Yanco Experiment Farm.

Popcorn.

Poor grain setting in the inbred area, and mishaps to small hybrid isolation areas at Leeton Experiment Farm, set back the hybrid popcorn programme. To speed up this work a small hybrid popcorn project has been commenced at New England Experiment Farm.

Hybrids have again given good results in yield tests, outyielding the open-pollinated variety White Rice by up to 100 per cent. and showing superior quality.

Sorghum.

Sweet Sorghum.—Improvement programmes continued with Saccaline at Hawkesbury Agricultural College and with White African at Grafton Experiment Farm. Poor germination at Nowra, caused by drought, prevented further advancement of the improvement of Early Orange carried on for the past few years in co-operation with Mr. A. J. D. Woolley of Brundee, via Nowra. Residue seed of selected lines will be re-sown in the coming season.

Our sweet sorghum varieties are gradually being improved and will soon be of high standard. Much poor seed from other than Departmental sources has been sold in New South Wales during the past three or four years. The introduction of a sweet sorghum seed certification scheme in conjunction with an expanded breeding programme at Hawkesbury Agricultural College will undoubtedly lead to a big improvement in seed quality. Variety trials were carried out in coastal districts. Two seed treatment trials were also sown.

Grain Sorghum.—Yanco and Leeton Experiment Farms continue to produce Foundation seed of the recommended varieties Caprock, Plainsman, Wheatland and Martin. Other promising varieties were also seed increased.

The variety trial and investigations into irrigation practices were continued at Yanco Experiment Farm. The fertiliser trial was carried on at Leeton Experiment Farm. District trials were generally failures because of the dry season.

The small breeding programme at New England Experiment Farm has been discontinued. Some introductions from United States of America are meeting all requirements. The new Queensland variety Alpha has also been introduced and will be tested against the standard types next season.

Broom Millet.—The improvement programme at Bathurst Experiment Farm has progressed. A second, similar programme has been commenced at Tumut in co-operation with the Tumut Broom Millet Growers' Association. A fertiliser trial carried out at Tumut again gave good results. Introductions from the United States Department of Agriculture are being tested further at Grafton Experiment Farm and at Tumut.

Cowcane.

The variety trial continued at Grafton Experiment Farm.

Summer Legumes.

Trials and seed production continued at Grafton Experiment Farm with soybeans, cowpeas, sunn hemp and other *Crotalaria* spp., velvet beans, mung beans, lab-labs, and kudzu. District trials were also sown on the central coast.

At New England Experiment Farm soybean trials and seed production of the best varieties were continued.

Winter Legumes.

Seed production of Lima and Kellerva Field peas continued at Grafton Experiment Farm.

Rice.

Approximately 39,000 acres were sown, 28,455 acres in the Murrumbidgee Irrigation Areas and 10,300 in the Wakool-Tullakool districts. Total yield may be in the vicinity of 75,000 tons of paddy at an average of 1.93 tons per acre, almost a third of a ton lower than the previous year's 2.2 tons average from 34,000 acres.

In the Murrumbidgee Irrigation Areas there is again striking evidence of the effect of the Department's work amongst rice growers. Whereas in the M.I.A. a high average yield, 2.14 tons per acre, was again obtained, the average in the Wakool-Tullakool area was only 1.4 tons. This poor yield is attributed directly to the farmers' inexperience. Rice growing is a comparative innovation in these southern areas. Their soil and environmental problems are not fully solved, but farmers have already benefited by advice and instruction and a further yield uplift will accrue from these services. The new settlers' increasing experience will enable them to apply the rotations, cultivation systems, and pasture improvement appropriate to their soil conditions, and recommended by agronomists.

Pure Seed Rice.—Leeton Experiment Farm has again been able to satisfy demands for pure seed rice. The importance of this scheme is realised by the entire industry. Not only farmers but the Rice Marketing Board and the Rice Millers are more than anxious to co-operate. To this end a most successful conference between the Department, the Rice Marketing Board, Rice Millers and Rice Growers was held.

The Murrumbidgee Irrigation Areas where rice farming has been established for many years afford interesting figures illustrating the influence of the Pure Seed Rice Scheme. The period 1934-35 to 1938-39 was the first five years of the scheme of Departmental Pure Seed Rice for farmers in the Areas. The yield average for those five years was 1.83 tons per acre. The years 1939-40 to 1949-50 was a period of war and transition, and Pure Seed was not supplied by the Department. The average yield for those successive five-year periods was 1.67 and 1.76 tons respectively. In the five-year period to 1953-54, the Pure Seed Scheme again operated, and for this period the yield average increased to 2.1 tons per acre. Allowing for the influence of season and farming methods, the increase is, at least in part, fairly attributed to the seed that farmers are receiving as a result of the Department's work.

Rice Improvement.—The plant breeder in charge of rice breeding, Mr. T. Lawler, is in Italy, on a scholarship, for twelve months. Whilst away he will examine overseas techniques and practices in rice breeding and cultivation. The rice breeding and testing work is being conducted on a limited scale during his absence.

The project for producing a short season high yielding variety is important because of the comparatively short season

prevalent in the Murrumbidgee Irrigation Areas but particularly important for the southern border rice growing districts. Tooth's strain of Caloro 2 is proving to be ten to fourteen days earlier in maturing than Caloro 2. Tests also show that its yield and other agronomic characteristics are comparable with those of Caloro 2. Therefore steps are being taken to increase this seed. Sufficient pure seed of the strain may be available to supply farmers' 1955 sowing needs.

Agricultural Extension Grant Demonstrations.—In the Murray district, fertiliser demonstrations are underlining the importance of sulphate of ammonia in rice growing. In these areas pasture establishment is comparatively recent, the nitrogen levels of the majority of the harsh soils are low, and sulphate of ammonia is giving that impetus to rice growth which makes the difference between success and failure.

Advancement of the rice harvest, to avoid losses through unfavourable weather in the normal harvest period, is also being demonstrated. In one type of test the mature grain is harvested with a high moisture content, then dried mechanically. In the other, the mature standing crop is dried by spraying with a desiccant, then harvested in the usual way.

Linseed.

In 1953 the area sown to linseed in New South Wales was less than 5,000 acres, a marked decline from the 18,000 acres of the previous year. The price offered by the linseed crushers had fallen to £65 per ton, compared with £70 in 1952 and £90 in 1951. Farmers accordingly lost all interest in this crop.

Linseed Breeding.—At Leeton Experiment Farm the object is a shorter seasoned variety than Walsh and, like the latter, resistant to rust and carrying high resistance to pasmo. The work has not succeeded yet. Some introduced varieties show promise, Uruguay and Plate in particular, but will be no more than a stopgap.

At Tamworth Experiment Station linseed plots were sown for the first time, and production of pure seed of Walsh was also commenced.

Peanuts.

Although New South Wales has to import most of its peanut needs, interest in this crop is still confined to the far north coast. Even there it is treated as a minor sideline or catch crop, grown mainly by dairy farmers. The Department is endeavouring to increase and spread farmers' interest in the crop.

Peanut Trials.—Small trials of the production of peanuts for market and as a dairy concentrate were conducted on private farms in the Manning River area and as far south as the Hunter River, with Departmental guidance and excellent results.



(Photo from Mudgee Office.)

Many parts of the State have a potential for peanut growing. Efforts are being made to popularise this oil crop.

There is a tremendous potential for this crop. Much of the land in the irrigation areas and along the western rivers is ideally suited. This was vividly shown last year when the Department conducted a small trial at Bourke. The yield there averaged over 17 cwt. per acre of highest quality nuts.

Tobacco.

At the Brisbane sales in June, 1954, a price of 207d. was paid for northern New South Wales tobacco. This resulted from Commonwealth regulation of the proportions of domestic leaf to be used by manufacturers. Because of the very high prices, widespread interest is being shown by New South Wales farmers.

Breeding and Experiment Work.—At Tenterfield Tobacco Station lack of staff has limited the experiments.

At Bathurst Experiment Farm, where tobacco breeding is conducted, progress is reported. This year leaf of extremely good quality was produced in the breeding nurseries. A fixed hybrid, Mammoth Gold x Ambalena x Cash, shows complete resistance to mosaic. The leaf is high quality, silky in texture and particularly suitable for cigarettes.

Bathurst Experiment Farm has aimed also to produce tobaccos resistant to blue mould and nematodes, and wide species crosses have been made. Success is attending the blue mould work. Some lines under test completely resist all attempts to infect them with blue mould.

Two varieties from America, Bel T38 and Bel 8-4, are being used in crosses for resistance to nematode. This pest is becoming serious in parts of northern New South Wales and some western areas. The achievement of resistant varieties is essential to avoid widespread and costly soil fumigation methods.

Tobacco Field Trials.—Field trials were conducted at Bourke and Wentworth in western New South Wales. The tobacco produced at Bourke was high quality but spoilt by lack of curing facilities there. It was necessary to transport the leaf to Trangie Experiment Station. However, the results showed that good tobacco can be grown in the western districts.

At Wentworth, a farmer inexperienced in tobacco growing planted ten acres with Departmental assistance and produced 8,000 lb. of saleable leaf. Some was high quality. His noteworthy performance indicated the potential of the light, sandy, red soils of our western rivers. The yields and quality compared favourably with those obtained by experienced farmers in established tobacco growing areas.

The increased interest in tobacco through high prices and steady demand, and the low price being offered for dried fruits, the current main stay of this Wentworth-Mildura area, are so contrasting as to indicate tobacco as a possible substitute crop for irrigation farmers on suitable soils along the Murray-Darling Rivers. Already, the farmers there are enquiring about tobacco growing.

Hops.

Further trials were conducted in various districts. Tooth & Co. co-operated in the testing of samples but seem no longer interested in financing growers prepared to plant this crop. On the other hand two other major brewers have shown interest, and one subsidised the planting of an acre plot. The yields from this trial were lower than was anticipated, even for a first crop, but may be explained by the grower's inexperience. The quality of the hops was high and in an experimental brew was the equal of Tasmanian hops. The other brewery also helped the Department's experiments and, after analyses and tests, reported the hops to be good quality, comparable to Tasmanian hops. This company is considering assistance to growers to establish the crop.

A number of the plots failed because of co-operating farmers' inexperience or lack of attention. However, results in general are encouraging and indicate that trials should continue.

Castor Beans, Sunflowers, Etc.

Work with castor beans, sunflowers, lavender, pyrethrum, ramie and kenaf, continued. It resolved into routine maintenance of strains and pure seed lines, and testing overseas introductions.

Vegetable Crops—General.

Some interesting general items include: the Principal Agronomist (Vegetables), Mr. A. C. Orman's current investigational tour of the United States of America, Canada and the United Kingdom; the acquisition of three glasshouses to assist the vegetable improvement programme; the naming of another potato bred at New England Experiment Farm; and progress in the development of hybrid tomatoes.

Due to loss of overseas markets, and to consumer resistance and an accumulation of stocks, the vegetable canning industry had almost ceased to function. However, the accumulated stocks have been greatly reduced, and the various firms are

recommencing operations. Their production is likely to be restricted to match local requirements, but cost of production must be minimised to overcome consumer resistance. The overseas investigations by the Principal Agronomist (Vegetables) are expected to benefit the industry in that direction.

Departmental testing of vegetable introductions from overseas has become additionally important, because Quarantine Regulations now prohibit seed firms from introducing several kinds of vegetables. The firms must now look to the Department for information concerning the performance of new varieties overseas reported as successes. The number of introduced varieties tested was 186 compared with 212 in 1952-53.

Potatoes.

Potato Breeding.—Breeding proceeded as usual at the New England Experiment Farm and all new seedlings were grown at the Carson Sub-station. Promising seedlings were preliminarily tested at Crookwell and Guyra, and New England Experiment Farm.

Thirty-three different crosses were made, using disease resistant introduced varieties and locally developed breeding lines and varieties. These included Snow Flake, Sequoia, Cortland, Crana, Menak, Bismark, Adina, breeding lines 835a-4, 11-79 and 76-15; and Departmental seedlings S2540 (Factor x Katahdin), and S2674 (Satisfaction x Douglass Seedling x Katahdin). Further hybridisation was also carried out with species hybrids obtained from the Commonwealth potato collection at Cambridge.

Eight thousand new seedlings were grown at the Carson Sub-station, and 350 were retained. Some with the parentage Bismark x 11-79 and S2680 (Gold Coin x Saranac) x Adina were very promising. The parents in all cases possessed disease resistance or desirable agronomic features.

Over 550 second-year and 250 third-year and more advanced seedlings were sown. Approximately 100 were retained for further testing and selection. Once again the cross Monak x 11-79 was superior. Other good seedlings were from the crosses 835a-4 x Adina, Venus x 11-79, S2674 x Adina, and S2674 x Selection 19162.

The introduction programme was carried on as before. The most promising were Calrose and Pungo from the United States Department of Agriculture. Introductions made in previous years which showed out well were Kennebec and Ontario.

New Potato Varieties.—Two new varieties were released to growers: Crana, an early red-skinned variety, and Awaba, a later maturing white-skin type. They were sister selections from the cross Pontiac x Katahdin. Another New England Experiment Farm Seedling, S2674 (Satisfaction x Douglass Seedling x Katahdin), a very late maturing high yielding type, is proposed for release.

Common Scab (*Actinomyces scabies*).—The replicated trials in collaboration with the Biological Branch, to test varieties and seedlings for scab resistance, were completed. Of the introductions, Ontario and Menominee, both from the United States Department of Agriculture, showed good scab resistance and good agronomic qualities. So too did the Departmental seedling S2680 (Gold Coin x Saranac). Ontario has now been released to growers at Spring Hill, where the trials were conducted.

Potato Variety Trials.—Twenty-four trials were conducted. The most important were again at Guyra and Crookwell, where many promising new seedlings were tested. A trial was again undertaken at Narrabri, where Seneca, from the United States Department of Agriculture, did particularly well under the hot conditions.

Soil Fertility Investigations.—The soil fertility investigations at Guyra were hampered by the dry season. The fertiliser treatment comprising nitrogen, potassium and phosphorus, was easily the most superior. Of the green manure crops, field peas and Green Feast peas were the most effective. In the dry conditions little success was obtained with clovers. However, cocksfoot and perennial and Italian ryegrass made good growth.

Potato Moth Control Demonstrations.—Significant, sometimes spectacular, results were obtained in fifteen potato moth control demonstrations laid down to show the efficacy of D.D.T. for potato moth control. The moth is a major pest in N.S.W. potato areas.

Potato Seed Certification.—1,714 acres (198 growers) comprising 526 acres of Sebago, 326 of Sequoia, 286 of Monak, 217 of Saranac, 121 of Adina, 48 of Exton, 28 of S2674, 21 of Crana, 17 of Awaba, and 124 of less popular varieties were certified, compared with 1,728 (207 growers) in 1952-53. Applications for certification of 1,840 acres were received from 209 growers, compared with 2,678 acres (278 growers) in 1952-53. The lower figures were due partly to the introduction of the certification fee and partly to the fact that tableland growers in 1952-53 had found no difficulty in disposing of potatoes whether certified or not.

The Potato Growers' Association agreed to the introduction of a licence fee, on an acreage basis, to cover part of the cost of employing a Potato Seed Certification Officer with headquarters at Crookwell. The position was advertised but was not filled as at 30th June, 1954.

Potato Storage Tests.—Storage tests were carried out in co-operation with the C.S.I.R.O. on numerous varieties and unnamed seedlings. Adina and the seedling S2674 proved of excellent keeping quality and retained their good cooking quality.

Tomatoes.

Tomato Breeding.—Breeding for *Fusarium* wilt resistance was continued at Hawkesbury Agricultural College. In tests for resistance, introductions Lanai (from the University of Hawaii), No. 255 (from Professor Hanna), and *Fusarium* Resistant Marglobe, were the most successful. The second backcross seed of Rouge de Marmande, and Bonny Best x *Lycopersicon Pimpinellifolium* A160, were also grown. Both were quite resistant, but are not yet of sufficiently good commercial quality.

Of those tested at Yanco Experiment Farm, five showed complete resistance and two of these, TX160 A-1-2 and TX160 A-1-1 from the C.S.I.R.O., Victoria, were most promising agronomically. Others showing resistance were fifteen selections of a line from Professor Hanna, seven from Hawkesbury College, three from the C.S.I.R.O., Canberra, and one from Gordon Edgell & Sons, Cowra.

In field tests at various centres, the hybrids Grosse Lisse x Tatura Dwarf Globe 16-1-1-1-1-4, Grosse Lisse x Tatura Dwarf Globe 16-1-1-1-2-3, and Valant x Grosse Lisse F₂ were outstanding.

Once again, the yields of hybrids at Hawkesbury were in most cases much greater than those of the parents. Rouge de Marmande, Potentate, and Grosse Lisse hybrids, in F₁ generation, and some in F₂, show great promise.

Five different Positional Sterile John Baer F₂ crosses were grown to develop new sterile lines. The sterile plants have been backcrossed again with the parent varieties.

Eight fixed crossbreds in 6th and 7th generations were tested. The best were from the crosses Pearson x Tatura Dwarf Globe and Grosse Lisse x Tatura Dwarf Globe.

Tomato Introductions.—Of the many introductions tested at Hawkesbury College and the Yanco and Bathurst Experiment Farms, Cavalier and Doublerich from North Dakota were good. Doublerich showed good disease resistance. M6 and M1 from the C.S.I.R.O. showed promising disease resistance. Manasota and Rutgers 8823 from Cornell Seed Co., U.S.A., and Yates Strain Selections 32 and K, from Arthur Yates & Co. Pty. Ltd., Sydney, also performed well.

Tomato Variety Trials.—Variety trials at different centres showed J. Moran to be a very useful variety. Danmark, Early Pak, Lanai, Urbana, and Western Red, all from American sources, also performed particularly well.

A trial of sixteen varieties for canning tomatoes at Griffith indicated none superior to Tatiinter, although Early Pak, from America, and M1 and M6 from the C.S.I.R.O. gave good results.

Beans.

Breeding.—Breeding, for disease resistant varieties of good agronomic quality, continued at Hawkesbury Agricultural College. Preliminary testing of promising crossbreds was carried out at Yanco Experiment Farm, also on the south coast and in the near-metropolitan area.

At Hawkesbury, the seed of 11 new crosses in the F₁ generation, 4 crosses in the F₂ generation and 5 crosses each in F₃ and F₄ were grown. Single plant selections were grown in the vegetable garden in F₂ and F₄ generations, while several hundred selections and bulk seed were sown at the river farm.

The main parents used at Hawkesbury were Michelite, Pinto, Red Mexican, Landreth Stringless, Rust Resistant Kentucky Wonder, Westralia, Blue Lake Stringless, Hawkesbury Wonder, Clarendon Wonder, Windsor Longpod, Richmond Wonder, Logan, Granda, Little Navy, Fullgreen, Brown Beauty, U.S.A. Refugee No. 5 and Keeney's Refugee. The most promising crossbreds in the F₂ and F₄ generations were Richmond Wonder x Little Navy in F₂, Hawkesbury Wonder x Little Navy in F₂, Hawkesbury Wonder x Granda in F₂, Fullgreen x Brown Beauty in F₂, Logan x Granda, Hawkesbury Wonder x Granda selection B and Clarendon Wonder x Granda. Eleven F₁ crosses and selections were tested for resistance to anthracnose and rust. Selections of Richmond Wonder x Little Navy in F₂, Hawkesbury Wonder x Granda in F₂, and Fullgreen x Brown Beauty in F₂, were very promising and will be increased for trial purposes.

Field Testing of Crossbreds.—Twelve of the crossbreds developed at Hawkesbury were sown at Narooma on the south coast, and the two most promising were a selection of Hawkesbury Wonder x Granda and a selection of Brown Beauty x Logan. Of those tested at Yanco Experiment Farm, selections of Logan x Hawkesbury Wonder and Hawkesbury Wonder x Black Wonder, and Logan x Granda 7-3 were most successful.

Bean Seed Production.—Under the Bean Seed Certification Scheme, the acreage submitted for certification was slightly less than in 1952-53, but production is likely to exceed that year's record yield. Three hundred and twenty-one acres were submitted for certification, and 231 acres were certified. The estimated yield is 3,940 bushels. The 1952-53 figures were 457 acres submitted, 196 acres and 3,556 bushels certified.

The French Bean Seed Marketing Board came into existence during the year and its handling of the seed has been satisfactory.

The inherited mottle leaf abnormality has been eradicated from certified Tweed Wonder by growing a resistant strain.

Bean Productions.—Of the many introductions tested at Yanco and Hawkesbury, the most promising were Contender, Wade Snap and Streamline, all from the U.S.A., and The Prince from England. Of the pole bean introductions at Yanco the most promising were Alabama No. 1, Blue Lake 49-2006 and Kentucky Wonder No. 6, all from the U.S.A.

Green Peas.

Breeding.—Crosses of Super Alaska No. 30 with P87-33-8NC and Coopers Canner No. 75 were almost free from *Fusarium* root rot. Promising plants were also selected from No. 30 x Green Feast. Earliness and even maturity were dominant in these crosses.

A few new crosses were made. The parents were P84, P17, Green Feast, Coopers Canner No. 75, and Lathon Wonder, variously combined.

Pea Introductions.—About 25 introductions were tested at Hawkesbury and Yanco. The most outstanding were Feltham First, Lathon Wonder, Early Dwarf and Clucas' Comet, all from England, and Bonneville from the United States of America.

Onions.

Breeding.—Seed of 37 male sterile lines and crosses with male sterile lines were sown during 1953. Bulbs of 27 of these are on hand, and will be planted shortly. Seven Victorian Brown Spanish crosses now carry the genetic constitution S-ms-ms. It is proposed to self these lines and select for Brown Spanish type, to produce eventually a male sterile Brown Spanish line with the S-ms-ms characteristics.

Of the introductions tested at different centres, Asgrow U41 and Conchise Yellow, both from the United States of America, showed best results.

Rockmelons.

Resistance to downy and powdery mildew was tested on a number of varieties at Yanco Experiment Farm. Moderate resistance was shown by a few.

The best introduction tried at Yanco were Best of All, Hero of Lockinge and Blenheim Orange, all from England; Hales Best No. 36, Honey Rock and Sugar Rock, all from the United States of America.

Other Vegetables.

With the remaining vegetables, improvement consisted only of testing introductions. Such testing proceeded in respect of beetroots, cabbages, carrots, cauliflowers, cucumbers, lettuce, sweet potatoes and watermelons.

Minor Elements and Vegetables.

Many observational trials were carried out by district agronomists. Results were negative in many instances, but on the central and north coast the responses to molybdenum applications on vegetable crops, especially lettuce and cucurbits, were striking. Boron brought marked responses on some crops in the Clarence River area.

Soil Conditioners.

Several proprietary soil conditioners were on trial at Hawkesbury Agricultural College and Yanco Experiment Farm. In most cases, the materials have produced the results claimed by the manufacturers. However the trials will have to be continued over a long period to determine whether the soil treatment is a payable proposition. Bitumul, a by-product of bitumen production, was highly efficient in enhancing the germination of small seed in a heavy soil, by preventing surface crusting.



The Department's vegetable improvement programmes at Experiment Farms and Stations include introductions, selections and hybridisation.

Departmental testing of vegetable introductions has become additionally important, since Quarantine Regulations now prohibit seed firms from introducing several kinds of vegetables. The number of introduced varieties tested in 1953-54 was 186.

Pastures.

The season, in general, was unfavourable for pasture growth. On the north coast dry conditions alternated with heavy rains on the catchment areas, with consequent deterioration of pastures through serious floodings. On the northern tablelands and in some inland districts the dry weather continued into late autumn, so that pastures were at a standstill and several districts were proclaimed drought areas.

During the previous two years the area of sown pasture in New South Wales, exclusive of naturalized *Paspalum* had increased at the rate of approximately half a million acres per year. During 1953-1954 the unfavourable autumn, increased prices for pasture seeds, and difficulty in obtaining supplies of superphosphate, operated against the expansion of the sown pasture area. Even so when official figures are available for the statistical year ending March 31, 1954, they are likely to show that the rate of expansion in 1953-54 has exceeded that of each of the previous two years. The present area of sown pasture in the State is believed to be in the vicinity of 3,250,000 acres.

Owing to unfavourable seasonal conditions the increase in local production of pasture seeds reported last year did not continue. It is anticipated that there will be a shortage of some species, notably *Phalaris tuberosa*, for sowing early in 1954, but merchants are attempting to overcome this by obtaining *Phalaris* from the United States of America. The production of subterranean clover seed was somewhat higher than that of the previous season, and would have been considerably greater had not unseasonable heavy rains in January severely damaged some areas.

In addition to the increase in area of sown pastures, the tendency towards the use of superior species has increased. This is particularly so in the case of *Phalaris tuberosa*, and of H.I. ryegrass, a perennial species, in place of the annual Wimmera rye in better rainfall areas of the wheat belt. In drier parts of the wheat belt the pastures generally are based on Wimmera rye. Frequently this species alone is used in those drier areas, but the use of medics is increasing, particularly barrel medic, and a heavy demand for barrel medic 173 is anticipated when seed becomes available commercially.

In areas where subterranean clover has been used as a fertility building pasture, alone or in combination with Wimmera rye, the improvement of these pastures by incorporating such species as *Phalaris*, H.I. and perennial ryes, thus developing a perennial pasture, is increasingly apparent.

In recent good seasons natural pastures throughout the State have improved, showing thicker swards and an increased proportion of better species. However in the last season this trend ceased and in some areas was even reversed, indicating the importance of sympathetic management and a reasonable stocking rate on such natural pastures.

Native Pasture Investigations.—Native pasture investigations generally have shown that, under comparable climatic conditions, sown pastures will greatly outyield native pastures, and that little benefit is likely from management treatments other than that of maintaining grazing pressure at a level that will avoid overgrazing the native pasture. As further evidence, a Shannon Vale experiment comparing the dry matter yield and protein yield of native and sown pastures has shown that the sown pastures yield approximately four times as much as native pastures during winter and about two and a half times as much in summer. In addition, the protein yield of the sown pastures is about double that of the native pastures.

The C.S.I.R.O.—Department of Agriculture co-operative grazing trial at Trangie Experiment Station has shown that a stocking rate of one sheep to the acre is detrimental to the pasture, resulting in the loss of *Stipa* spp. Spring deferment results in more feed being available during the summer. Any advantage from autumn deferment has been masked by prolific winter growth.

Improvement of Native Pastures.—Investigations chiefly concerned with ways of incorporating superior species, particularly legumes, into the native grass sward, are in progress at several experiment farms.

At Trangie Experiment Station very successful results have been achieved where furrowing of scalded areas preceded the sowing. The species most readily established were annuals such as Wimmera rye. Perennial grass species did not establish well, but the furrowing encouraged crowfoots and medics.

At New England Experiment Farm, surface seeding of white and subterranean clovers into native pastures has given good results. Essential features for success of surface seeding in the New England and other districts appear to be adequate superphosphate, effective inoculation, lime where required, and sympathetic management during the establishment period. The newly developed sod-seeding machines, rotary and hoe types, are included in these investigations. Since much of the grazing land in New South Wales will continue in native pasture this phase of agrostology is very important.

Sown Pastures Investigations at Experiment Farms.

The dry conditions were detrimental to pasture investigations at the experiment farms and colleges. At Hawkesbury Agricultural College it was assessed statistically that the probability of obtaining useful yield figures from experiments sown in 1954 was one chance in thirty. At several experiment farms such climatological studies have received more attention and are valuable complements to field experiments.

Pasture Species.—Rapid expansion of the area sown to improved pastures in recent years, particularly in southern districts, has been possible because of species climatically suited and readily established. However in some parts of the State, despite farmers' interest, progress is slow in comparison. This is primarily because of the limitations of available species. The problem of securing more suitable species is therefore receiving considerable attention at experiment farms. The closest co-operation is being maintained with the C.S.I.R.O. Co-operative investigations are in progress at Trangie Experiment Station, and the C.S.I.R.O. is using several of the Department's experiment farms as testing grounds. In addition, material from the C.S.I.R.O. introduction nurseries, and from direct overseas contacts, is being tested.

At Trangie Experiment Station *Panicum antidotale*, *Stipa hyalina*, *Panicum coloratum* var. *makarikaricensis*, *Setaria sphacelata* and *Cenchrus ciliaris* continue to show promise. The last mentioned has shown its ability to stand up to heavy and continuous grazing and to regenerate readily, a valuable characteristic under western conditions. *Phalaris tuberosa*, *Phalaris arundinacea* and *P. tuberosa* x *P. arundinacea* hybrid are also developing reasonably well, and trials of early maturing *Phalaris* spp. recently collected by the C.S.I.R.O. in the Mediterranean area are being watched with interest.

The drier districts, outside the range of subterranean clover, urgently require legumes, particularly for short-term pastures. The annual medics are helping towards meeting this need and the recently selected barrel medic 173 will be a valuable addition to the plants available. Scurfy Pear (*Psoralea bituminosa*) has proved very dry-weather resistant at Condobolin and Cowra Experiment Farms. It is also a free seeder and regenerates readily.

In the higher rainfall areas, particularly on the tablelands, cocksfoot strains are promising on lighter soils. The recently-acquired C.S.I.R.O. collection of Mediterranean cocksfoot is of great interest there. Other species of promise for tablelands areas include *Bromus inermis*, *Festuca elatior*, *F. arundinacea* and *Hordeum bulbosum*.

On the north coast, summer legumes are of great importance. At Grafton Experiment Farm *Phaseolus lathyroides* and *Desmodium uncinatum* have done well and are now included in field trials. A further collection of sup-tropical legumes has recently been obtained for trial at Grafton. In addition, all available white clover strains are being tested. Ladino white, possibly because of its more erect growth than New Zealand white, seems the best available strain for the far north coast.

Seed increase areas of many of the above species have been established to facilitate field trials.

Pasture Establishment.—At Yanco Experiment Farm it has been shown that a subterranean clover-Wimmera rye pasture became subterranean clover dominant in the year after sowing where a nurse crop was used. With no nurse crop the pasture was grass dominant.

At Wagga Experiment Station and Temora Experiment Farm skeleton weed spraying is being studied in relation to the effect on lucerne establishment.

The seeding rate of Wimmera rye when sown with lucerne has been further studied at Trangie Experiment Station and Condobolin Experiment Farm. Results suggest that under dry conditions the seeding rate of Wimmera rye should not exceed $\frac{1}{2}$ lb. per acre. This confirms earlier work at Temora.

Hawkesbury College time of sowing trials have shown that the earlier the sowing the higher is the yield of pasturage produced prior to the spring. Late autumn plantings resulted in severe spring weed competition. Spring plantings suffered from weed competition and from the effect of dry weather before the pasture had become established. Northern tablelands experience is similar except that because of cooler climatic conditions, early spring planting is satisfactory. Early sowing, yielding maximum first year production, is of great importance in short term rotation pastures.

At Leeton Experiment Farm the establishment of irrigated pastures, particularly summer pastures based on *Paspalum*, is being investigated. Results indicate that good establishment is obtained from a well-prepared seedbed, but early autumn broadcasting of seed into Japanese millet stubble is also satisfactory. At Yanco Experiment Farm subterranean clover and Wimmera rye were successfully established in heavy rice stubble, by offset discing before and after broadcasting the seed and superphosphate.

Pasture Nutrition.—Rate and frequency of superphosphate application are under investigation at various Experiment Farms. Series of coastal plant nutrition and trace element trials are in hand. A trial of the effects of fertilizers on nodulation is in progress at Hawkesbury Agricultural College. At Bathurst Experiment Farm, lime has given no response, but pasture production has been increased 20 per cent. by 1 and 2 cwt. of superphosphate per acre. At New England Experiment Farm, 2 cwt. of superphosphate per acre has given significantly better results than 1 cwt. per acre over a five-year trial in a long-term pasture on a black basalt soil.

Also at New England Experiment Farm, a sulphur response has been obtained from lucerne on a black basalt soil. Highest yields and best response from an old lucerne stand were obtained with annual dressings of 1 cwt. superphosphate in autumn and 1 cwt. sulphate of ammonia in the spring. Recent analyses show that sulphur content of lucerne from plots receiving both nitrogen and sulphur was three times the sulphur content of lucerne receiving superphosphate or elementary sulphur only.

Lime use in New South Wales, and in Australia generally, has been reviewed. It is now apparent that:—

- (i) Some apparent lime responses have been due to molybdenum availability conditioned by heavy rates of lime application.
- (ii) Small quantities of lime (2 cwt. per acre), in conjunction with inoculated and adequately fertilized pasture seeds, greatly facilitate nodulation and subsequent establishment; especially so on some southern tableland acid soils.
- (iii) Lime at appropriate rates greatly stimulates the growth and multiplication of useful *Rhizobia*, the result being in fact an inoculation response, whilst seeming to be a lime response.

Some liming experiments are in progress at the Experiment Farms and Agricultural Colleges. Ground rock phosphates have given little evidence of value as a source of phosphorus in pasture topdressing.

Trials of nitrogen are in progress on pastures. These include *Paspalum*—white clover pastures in the M.I.A. and *Paspalum*-kikuyu pastures on the north coast. In the latter case the objective is to increase late summer and autumn production by supplementing the nitrogen supply at a time when it is thought to limit pasture production.

In trace element trials at Hawkesbury Agricultural College, no pronounced trace element deficiency has been recorded. Boron deficiency is suspected on one soil. Water-logged soil conditions caused marked production of anthocyanin in the leaves of subterranean and red clovers at the College. The symptoms were closely akin to boron deficiency symptoms. Further trials are proceeding.

Potassium deficiency symptoms in lucerne were apparent on four soil types at Hawkesbury Agricultural College. Potassium may in future assume greater importance in plant nutrition in New South Wales.

At Bathurst Experiment Farm, lucerne topdressing, renovation, and fertiliser placement trials have been initiated.

At Berry, nutrition experiments reveal that superphosphate is the main need, though molybdenum response is often also recorded.

Pasture Management.—Several pasture renovation trials are in progress, but no trials involving the animal factor are being conducted, other than the co-operative trial with the C.S.I.R.O. at Trangie. Lack of staff has prevented work of this nature.

Pasture Plant Breeding.—Breeding has lapsed because of frequent staff changes, and because species work is more important at present. Useful breeding material of *Phalaris*, cocksfoot, and white clover are being maintained at Glen Innes. Work on lucerne and Wimmera rye is continuing at Wagga Agricultural College and the Temora Experiment Farm.

Pasture Work in Aronomists' Districts.

In keeping with the increased pasture sowings, pastures occupy an ever-increasing place in the activities of district agronomists.

Trials and Demonstrations.—Pasture trials and demonstrations have been designed to assist extension officers to publicise the advantages of pasture improvement in their particular districts. The work is rarely of a research nature but is exploratory, particularly when extending the limits of a desirable species or strain. Accordingly, method of establishment, liming rates, superphosphate rates, and strain and species trials, have been established. There are approximately 160 such trials in the State.

Minor Element Trials.—In all districts minor element trials have been laid down, mainly of the Anderson type, by district agronomists and private individuals. The total of these trials is estimated to be in the vicinity of 300. In most cases there

has been no response, but drought conditions may be masking possible responses. Several pasture responses to molybdenum have been reported in the Goulburn, Bega, Murwillumbah and Cooma districts. Isolated responses to molybdenum have been reported in the Orange, Grafton, Taree and Tumut areas. Sulphur responses have occurred on heavy black soils in the Cooma and Tamworth districts. In collaboration with the Chemist's Branch, the Division of Plant Industry is also conducting randomised replicated trials in the Taree, Grenfell and Pilliga scrub areas.

Legume Inoculation.—In most districts it is now standard practice to inoculate legumes when sowing a new area. Inoculum strain trials are being conducted by some district agronomists in co-operation with the Biological Branch.

Superphosphate for Pastures.—The use of this fertiliser is increasing in western and north-western areas where, previously, it was considered unnecessary. This increase is especially noticeable in the Orange, Dubbo, Parkes and Inverell districts.

Aerial Sowing and Topdressing of Pastures.—This method has been practised in the Glen Innes, Armidale, Tamworth, Young, Albury and Cooma districts. Despite some cases of loss and wastage, the district agronomists consider the results satisfactory.

Pasture Seed Certification.—Seed certification schemes are operating for subterranean clover, *Phalaris tuberosa*, irrigation white clover, and perennial ryegrass.

Approximately 355 tons of Mt. Barker, 77 tons of Dwalganup and 20 tons of Tallarook subterranean clover were paddock-sealed in the Wagga region. No Bacehus Marsh strain was harvested there, due to extensive earth mite and rain damage. Heavy falls of rain at the end of summer affected the yields of midseason and late varieties, but had little effect on early strain production.

Some 10,000 lb. of cleaned *Phalaris* seed was harvested. No seed of irrigation white clover or Perennial ryegrass was harvested.

Due to the considerably increased sowing of H.I. short rotation ryegrass a scheme is being considered for certification of this seed.

Weed Control.

Weed control by use of herbicides has become more widespread. For instance, it is now virtually standard practice to spray skeleton weed infested crops with 2,4-D. Other weeds of cereals, particularly thistles, are also regularly sprayed. At the same time farmers' demand for information in newer fields of chemical weed control has increased, especially concerning weeds in improved pastures, lucerne, and vegetables.

Apart from those trends, the continued spread of serrated tussock is causing serious concern. Attention has been drawn also by some newer weed species which could become major problems.

Co-operation with Local Government.—Once again £20,000 was made available through the Department of Local Government to assist Councils to control noxious plants. Councils are required to supplement any grant £ for £.

Weeds Division Conferences were held at Inverell, Muswellbrook, Coonabarabran, and Newcastle, and attended by representatives of Shires and Municipalities centred on those towns. As a result changes are being made in the plants declared noxious in the respective areas.

Extension Services.—Advice on weed control was given by the Special Agronomist (Weeds) and district agronomists to farmers, home gardeners, manufacturers, and councils. Information on research findings was also forwarded to a number of overseas and interstate research workers. The publication, *Weed Control with Chemicals*, was widely demanded.

Skeleton Weed (*Chondrilla juncea*).—The fact that spraying of skeleton weed in cereal crops is now standard practice wherever this weed is important, is a direct result of the Department's research at its Experiment Stations and Farms. In the past year this research confirmed that the optimum application rate is $\frac{3}{4}$ lb. 2,4-D per acre, and clearly demonstrated the importance of spraying as late as compatible with the growth of the crop. Little or no yield increase is experienced in the year of treatment, but the benefits of spraying are apparent in improved crop and pasture growth in subsequent years.

Serrated Tussock (*Nasella trichotoma*).—This is now regarded as the State's most serious weed pest. Some of the old infestations are increasing and new infestations are found with disturbing frequency. The shires in which serrated tussock occurs have formed a committee, which gives hope of more concerted control actions.

Six areas have been established in the central tablelands to demonstrate control by improved pastures. A mobile weed spray unit commenced field operations at the end of May and, facilitated by the appointment of a field assistant for the project, nine spray control areas have been laid down in the south and south west. These two projects will extend valuable

information to farmers and will, in the light of experience gained, enable more precise advice to be extended in the future.

Crofton Weed (*Eupatorium adenophorum*).—The stem-gall fly parasite of crofton weed was introduced to northern N.S.W. during December. It is now well established at a number of sites and is reported to have spread up to a quarter of a mile from the site of liberation. High hopes are already held that this parasite will so reduce the vigour of crofton weed that the latter will cease to be a major pest.

Mintweed (*Salvia reflexa*).—The area covered by this weed was considerably reduced in 1951 and 1952, but spread has been noted in the past year because adverse conditions reduced the grass cover. Mintweed is not a menace where there is a good grass cover, and this must be the final means of control. Landholders are heeding advice that property management must be directed towards maintaining a good grass cover by eradication of rabbits, by proper subdivision, and by conservation of fodder.

Paspalum (*Paspalum dilatatum*) in Suburban Areas.—In co-operation with Ryde Municipal Council a series of plots was laid down to control this weed on suburban footpaths. The most satisfactory results were obtained with sodium chlorate at about 130 lb. per acre. Diesel distillate and sodium chlorate-borax mixture also proved effective.

Thistles.—Control of thistles in improved pastures was subject of some work in co-operation with spray manufacturers. Promising results have been obtained without serious damage to subterranean clover. Expansion of spraying in this field is anticipated. A recently developed phase of this problem is the rapid spread of black thistle in the Murrumbidgee Irrigation Areas, consequent on increased pasture improvement.

Some New Weeds.—Blue heliotrope (*Heliotropium amplexicaule*) is a deep rooted perennial species causing concern in Queensland and which has been located in several N.S.W. centres including fifty acres at Castlereagh. It is very resistant to weedkillers. Wild turnip (*Brassica tournafortii*), a common weed of cereals in southern States, is becoming more widespread. It has now been reported from a number of central and southern N.S.W. areas and seems to have been introduced with wheat seed. Cockle burr (*Xanthium italicum*) has been found widespread in the Hunter and Hawkesbury River districts. It will be more deleterious to wool than Noogoora Burr if it spreads into wool growing districts. Caterpillar weed (*Heliotropium europaeum*), known to cause toxæmic jaundice in sheep, seems to be more widespread than formerly.

Seed Testing Laboratory.

The flow of work to this section of the Division of Plant Industry has further increased. The interest in pasture improvement, the increase of seed certification, the establishment of the French Bean Seed Board, and increased inter-State trade in grain for stock feed, all represent greater demand for seed testing services.

To help to meet the situation, it has been decided to increase the facilities by establishing an annex at the Botanic Gardens with a staff of four additional assistants. Equipment has been ordered on a special Treasury Grant.

In addition to routine services, the Police Department was assisted in a case of arson. Information regarding testing was also given to various commercial firms.

About forty samples were submitted to the Chief Biologist for examination of seed-borne pathogens, and sixty to the Chief Entomologist regarding identification of insects found in the samples.

Agricultural Seeds Act, Stock Foods, and Medicines Act (Bird Seed and Seed for Stock Foods).—The Seeds Inspector inspected 165 wholesalers and retailers in the city and suburban areas, including Newcastle, and visited seventy-eight country towns, to inspect 450 stores. Six storekeepers were warned under the Agricultural Seeds Act.

The importation of sorghum into N.S.W. from Queensland greatly increased. All consignments were examined and a large proportion was found to contain noxious weeds, principally mintweed (*Salvia reflexa*). Two weed infested consignments from Queensland, each of more than 600 bags, stored temporarily at Botany, were seized by the Department under the provisions of the Stock Foods and Medicine Act. At 30th June, 1954, action thereon had not been completed.

Irrigation.

The Division of Plant Industry is represented in various committees concerned with irrigation development in N.S.W., including the Murray River Irrigation Development Committee, Blowering Dam Investigation Committee, Macquarie River Investigation Committee, Hunter Valley Conservation Trust, and the Irrigation Development and Food Production Advisory Committee.

Conferences have also been attended and inspections made in connection with use of the Keepit Dam waters, and with Tullakool Irrigation Area matters,

A review of the position regarding drainage trusts and unions has commenced, in an effort to bring about increased production on lands affected by poor drainage. This is a co-operative project between the Departments of Public Works, Local Government, and Agriculture, and the Water Conservation and Irrigation Commission.

Spray Irrigation Survey.—A spray irrigation survey in co-operation with the Commonwealth Department of Commerce and Agriculture is under way. The results will be used in rewriting the bulletin *Spray Irrigation*. As a preliminary, some 400 pilot survey questionnaires were forwarded to spray irrigators. Personal interviews of a sample selected from the responses will follow.

War Service Land Settlement.

During the first seven months of the year the demand for inspection of estates under the War Service Land Settlement Scheme proceeded slowly, but the provision of a further large sum for settlement increased the demand. The Closer Settlement Advisory Boards were unable to expend the allotted money in the time available. The sudden increase in inspectional work will continue for some months in the new financial year.

DIVISION OF HORTICULTURE.

Regulatory Work.

Quarantine Services.

Importations of overseas plants and plant products were examined for the Commonwealth Department of Health in accordance with the Quarantine Act and inspections were maintained at a high level.

Importation of Seeds.—Numerous consignments of vegetable seeds were imported from New Zealand, U.S.A. and Holland. Many consignments of flower seeds were received from the United Kingdom, New Zealand and Holland. Mites were found in several consignments; otherwise the seed was generally satisfactory. Record shipments of grass seed, mostly rye grass and clovers, were received from New Zealand and were reasonably free from disease, but some consignments contained noxious weeds and required recleaning before release to importers.

Importation of Living Plants.—Some 19,500 living plants, excluding orchids, were imported. One consignment of 13,491 from Holland arrived free from disease and in excellent condition, with the exception of 200 ivy plants infested with a



(Photo from Murrumbidgee Office.)

The Annual Field Day at Duranbah Experiment Station attracts hundreds of growers interested in the results of banana industry and other tropical fruit research.

At 31st May, 1954, 1,015 settlers had been established under the Promotion Settlement Scheme while, under Acquired (Ballot) Estates, 893 settlers have been established on twenty-eight estates. Reports from various sources indicate a general high level of farming by the settlers. They continue to avail themselves of technical guidance through the extension services of the Department.

Rural Electricity Advisory Service.

Fewer interruptions to the electricity supply, increased Government subsidy for rural extensions, and publicity given to this advisory service by Departmental publications, led to increased inquiries for advice on electrical matters affecting farms. The demand for advisory service will continue to increase as the range of uses of electricity in country areas becomes more widely appreciated and further rural extensions of electricity occur.

The Rural Electricity Officer is now required to devote the greater part of his time to extension advice under the control of the Electricity Authority of New South Wales. This is expected to increase opportunities for extension service to rural people.

soft scale. This consignment was the first to come under the Commonwealth regulations requiring all nursery stock to be fumigated with methyl bromide before inspection. Plants with soil adhering to their roots were washed before release.

Importation of Orchid Plants.—Imported orchids mostly comprised large quantities of young Cymbidium plants mainly from the United Kingdom and Holland, and Vanda and Dendrobium plants from Honolulu. Other countries concerned were France, New Zealand and India. Plants from New Zealand showing virus diseases were withheld from delivery, and remain in quarantine, while some infected plants from the United Kingdom were returned to that country by the importer.

Post Entry Inspections at Registered Nurseries.—Periodical post entry examinations of imported nursery stock at registered nurseries throughout the growing stage disclosed very few fungal or bacterial diseases. However, there were several instances of virus diseases, and these plants were immediately destroyed. Generally, the imported plants' degree of freedom from disease was very satisfactory due to extreme care taken by the exporters who, in the selection of plants, are aware of the rigid control measures applicable to all plants imported into this country.

Importation of Gladiolus Corms and Dahlia Tubers.—Gladiolus corms and Dahlia tubers are included, under amendment of the Nursery Stock Regulations, in specific regulations requiring post entry examination during one complete growing period. These conditions of importation have stopped the

previous great importation rate of commercial quantities of gladiolus corms which in the past were frequently heavily diseased.

Parcel Post.—All overseas parcels subject to Commonwealth Plant Quarantine Regulations were examined at Parcels Post Office. Of 12,095 parcels and packets submitted for inspections 3,575, representing 28.5 per cent., were detained either for treatment or destruction, as the case required. The number of parcels of vegetable and flower seeds weighing from 5 lb. to 20 lb. imported as commercial consignments further increased. In addition to seeds, considerable consignments of plants, budwood and bulbs have been forwarded through this channel.

Passengers' Baggage.—A wide range of plant material, seeds, fruit, etc., was intercepted at the wharves in passengers' baggage from overseas vessels. Most of it was prohibited, and was either destroyed or subjected to control treatment.

Timber.—Timber importations amounted to 141,000,000 super feet, a big increase over the previous year's 54,000,000 super feet. This increase is partly due to relaxing of import restrictions. During 1951-52, 145,000,000 super feet were imported and this year's figures reflect normal trading. The total sawn timber imported was 124,000,000 super feet, three-quarters of which was Douglas Fir timber from North America. The remainder comprised *Pinus insignis* from New Zealand, Parana Pine from South America and Pacific Maple from Borneo. Log timber amounted to some 16,000,000 super feet, mostly Maple from Borneo and Indonesia.

Insect infestations were very light, but several consignments of sawn Klinki pine from New Guinea were infested with Pine Weevil and were fumigated with methyl bromide. A consignment of logs from New Caledonia was borer infested. After regular Gammexane treatment the logs were sawn into timber, which was fumigated with methyl bromide. All off-cuts were burned.

Export Inspections.

Fresh fruit and other produce for export were inspected for compliance with the export regulations. The main exports of fresh fruit were oranges and apples. Small quantities of seasonal fruit, such as pears, grapes, stone fruits and tomatoes were also exported, mainly to the Pacific Islands.

Citrus.—New Zealand again received almost all the Navel oranges exported from New South Wales. A total of 53,417 bushel cases was shipped to that country whereas only 2,730 cases were shipped elsewhere, mainly to Singapore. The export season was shorter than usual, commencing early in June and continuing until August. The quantity shipped was less than last year owing to heavy frost damage in the Murrumbidgee Irrigation Areas. All Navel oranges exported, except a small quantity from the coast, were from the Murrumbidgee Irrigation Areas. The packing generally was very good and the fruit of excellent quality until frost damage caused rejections and severely curtailed New Zealand shipments. Exports of Valencia oranges commenced in September with a shipment of 23,224 cases to Hamburg, Germany, and exporters had extreme difficulty getting fruit from the M.I.A. to comply with export standards. Many rejections occurred at ship-side for over-acid fruit. There were also rejections for mussel scale and rind breakdown in 5,000 cases from the Gosford district. It is unlikely that this market can be satisfactorily developed, as supplies from much closer countries are adequate for all but about three weeks in each year. Shipments of 85,135 cases of Valencia oranges to New Zealand commenced in August and extended to January. The quality was excellent, few rejections were recorded, and breakdown losses were negligible.

Pomes.—Owing to the large New South Wales crop of apples shippers made every effort to fill all allocated space for overseas shipments. Early shipments to the "East" (Singapore and Hong Kong) commenced in March with the larger sizes of Granny Smith apples, leaving the more favoured smaller fruit for the United Kingdom; 50,945 cases of apples were shipped to the United Kingdom and 17,032 cases to the "Eastern" markets. The quality was very good. The U.K. shipments were mainly from the Murrumbidgee Irrigation Areas. Ship-side rejections were light.

Flour and Rice.—Flour exports were less than last year, due to fewer large shipments to the United Kingdom and Colombo, but consignments to the "East" considerably increased. Inspections revealed a good standard of bag used, and few consignments were infested with weevils. Export of rice substantially increased, shipped mainly to the Pacific Islands and New Zealand.

Importation of Interstate Fruit.

Four hundred and ninety-five thousand cases of apples and pears from Tasmania, in sixty-nine separate shipments, mostly between April and November, 1953, were generally very satisfactory. A few apple consignments were marked down from "Fancy" for excess blemish, and required repacking.

More Navel and Valencia oranges from the South Australian and Victorian irrigation areas than last year were marketed in Sydney. Almost all were well packed, and graded much

better than most of the New South Wales packs. This competition, most evident in the late market, depressed prices for local fruit.

City Markets and Retail Inspections.

Fruit Inspection, City Markets.—Regular fruit inspections were maintained in the city markets. Generally, packing houses graded and packed their fruit satisfactorily to comply with regulations but a number of individual growers' packs were poorly graded and loosely packed. Seventy growers were warned and four were prosecuted for topping offences.

Citrus.—Oranges were in heavy supply from most districts, causing a marked drop in prices. The Navel oranges from the Murrumbidgee Irrigation Areas in July, 1953, were of good quality and mostly free from scale, but Valencia held for late marketing, January to April, showed a lot of black spot and scale infection, and developed coarse skins. First consignments of 1954 Navel oranges from Queensland were marketed in Sydney early in April. All had been gas coloured. They passed the maturity standard when tested but were poor flavoured and did not sell well.

Although packing houses were allowed to market oranges in "pockets", the "pockets" were used less than last year and appeared to be going out of favour.

Quality and packing of coastal lemons was very poor. Supply was irregular.

Apples.—Apples from June to November, 1953, were very scarce. Growers and agents removed from cool storage quantities small enough to supply customers without depressing prices. Supplies were plentiful from this year's record crop, and the fruit was of better quality than usual, free of hail damage and codling moth. Black spot was prevalent in most districts and caused much of the fruit to be marketed only as "Good".

Grapes.—Grapes were plentiful due to the limited quantities required for processing. Quality and condition were excellent from all districts.

Tropical Fruit.—Reasonable quantities of pineapples were available and were marketed in good condition. However, when trains were delayed by floods and derailments, causing breakdown of the fruit, many consignments were condemned. Bananas were in light supply between May and November, 1953, and grading was poor due to under-sized fruit and the mixing of sizes. From December onwards supplies increased considerably and grading improved with better quality fruit. Consignments from twenty-two growers were de-graded and two were prosecuted for breaches of the Banana Grading Regulations. One consignment of 124 cases was condemned for squirter disease. That occurred in a period when dipping was not compulsory.

Tomatoes and Lettuce.—The grading and packing of locally grown tomatoes, especially from coastal areas, markedly improved. Large quantities well packed and graded and of good quality, arrived from Victoria and South Australia by road. Lettuce from Victoria marketed in good, clean cases contrasted with the bulk of local consignments, which were marketed mostly in old second-hand cases.

Potatoes.—Some 1,210,000 bags of potatoes were submitted for inspection—250,000 less than last year. Tasmanian consignments, 754,900 bags, although 47,000 less than last year, were more than half of that total. The condition of the bags and the branding of the trade descriptions from July to January were bad, but marked improvement was noticeable thereafter. Small amounts of dry and wet rot were recorded. Victorian consignments totalled 171,000 bags. Until September, 1953, moth infestation and dry rot necessitated picking over numerous consignments before they were released to the trade, but subsequently the quality and condition were satisfactory. Western Australian shipments, totalling 103,000 bags, arrived in satisfactory condition. Queensland forwarded 42,500 bags and South Australia 3,300 bags, and the quality and condition were satisfactory. Local (New South Wales) consignments totalled 98,000 bags. Of this total, 15,000 were withheld from sale, to be picked over before release, for moth infestation, scab, wet and dry rot and black beetle damage. The latter was widespread throughout the State.

Fruit Shops and Barrows.—City fruit shops and barrows were inspected. Five owners of fruit barrows were convicted of topping and six owners were warned concerning topping.

Condemnations.—Fruit and vegetables condemned and destroyed by boiling at the Export and Import Branch were for: fruit fly and codling moth, 1,100 cases; blight and grub in tomatoes, 102 cases; squirter in bananas, 134 cases; blight, grub and celworms in potatoes, 1,352 bags.

District and Suburban Inspectional Work.

Fruit Fly.—This pest considerably damaged fruit in various parts of the State. That was usual in the Cumberland District but, in addition, a serious outbreak in the New England Region and infestations in western districts caused

concern. Due to inability to recruit suitable staff, desired fruit fly "clean-up" campaigns could not be effected where and when required. If suitable staff is available such campaigns will be carried out next season in various parts of the State. A close watch will be imperative at Narromine, where fruit fly was particularly active last season, because infested fruit from this district could find its way to the Murray River region. If that happened it could be disastrous for the citrus industry along the Murray River.

Citrus Gall Wasp.—This pest has spread disturbingly in recent years. In an effort to prevent its entry to commercial orchards and nurseries surrounding Gosford and in the Cumberland district, as much staff as possible last year was devoted to a survey of the spread and to eradication of the pest. Special efforts to "clean-up" the Citrus Gall Wasp were intended, but were hindered by inability to obtain suitable staff. The full-time of one Inspector for four to six months is being utilised for this work, but more will be employed in the campaign immediately they are available. If infection of commercial orchards in the Cumberland and Northumberland areas can be prevented, the Department will have rendered a valuable service to those citrus growers. In co-operation with the Entomological Branch, publicity has been given to the importance of controlling this pest.

Country Potato Inspection.—Potato inspections at points of production and despatch continued as far as possible. That service permits the Potato Marketing Board considerable elasticity in marketing, since without country inspection the potatoes would in many cases have to be forwarded to Sydney prior to distribution by the Board. In addition to inspection of table potatoes, Departmental inspectors last season inspected and sealed 37,000 bags of potatoes for the New South Wales Certificated Seed Potatoes Co-op. Ltd.

Enforcement of Regulations.—In the twelve months it was necessary to institute proceedings against seventy-nine persons and to warn a further seventy-three persons for infringement of the Plant Diseases and Irrigation Acts.

Extension Campaigns.—Special extension campaigns were carried out in parts of the State: on the Murray River, campaigns for black spot and downy mildew control in vines, and also for the use of sulphite dips for sultanas. This latter campaign was mainly responsible for the use of this dip increasing from 10 per cent. of the sultanas dried in 1953 to 90 per cent. in 1954. The procedure considerably improved the Murray River sultana grade.

In the New England Region a pruning campaign was effected, with twenty-three demonstrations in twelve different centres.

In the Murrumbidgee Irrigation Areas a red scale control campaign was conducted. All citrus blocks were inspected at least once and in many cases twice during the season. Packing sheds in the Murrumbidgee Irrigation Area were also given special attention in an effort to improve the quality of the fruit packed for export.

General.

Advisory Committee—Fruit Cool Storage Investigations.—Work supervised by this Committee has been extended this year to study the effects of chemical thinning and of pre-harvest drop sprays on apple storage. Cell numbers and enlargement are also being studied on chemically thinned apples. The fruit studied was from experiments at the Department's Bathurst Experiment Farm. The Committee continued to review the cool storage and quick freezing research carried out co-operatively by the C.S.I.R.O. and the Department, and the investigations at the Plant Physiology Laboratory, Botany Department, University of Sydney. The Gosford Citrus Wastage Research Committee, co-ordinating work at the Citrus Wastage Laboratory, acts as a sub-committee.

Fruit and Vegetable Processing Committee.—This committee met twice, to co-ordinate research work on fruit and vegetable processing conducted by the C.S.I.R.O. Division of Food Preservation and this Department. All investigations concerning canning, dehydration and quick freezing were under attention. Suggestions were made for further work on storage and ripening of peaches and apricots for canning, the influence of citrus tree stocks on bitterness in canned orange juice, the uptake of sulphur dioxide in fruit for drying, the canning of solid-pack apple, and off-flavours in frozen pineapple.

Commonwealth Dried Fruits Processing Committee.—This committee advises the dried fruits industry on technical problems and is representative of New South Wales, Victoria and South Australia. It dealt with investigations of bulk dehydration and sultanas, and technical aspects of the preparation and storage of glace fruits. It prepared standard recommendations for the drying of vine fruits.

Fifth Australian Canning Convention.—The Department of Agriculture takes an active interest in the Australian Canning Convention. An officer of the Division of Horticulture was Convener of the Convention held in Melbourne in September, 1953. Growers, canners, technologists and other groups associated with the industry were represented and discussed their sectional problems as well as matters affecting the industry as a whole.

Canning Fruits Advisory Committee.—This committee, under the chairmanship of an officer of the Division of Horticulture, was established by the canning industry to consider canning fruit production trends and to advise the industry on canning fruit plantings. The committee prepared a comprehensive report on the present position and future requirements in canning peach planting. Murrumbidgee Irrigation Area problems in production of canning apricots were also considered.

Citrus Industry.

Citrus Industry Extension Work and Trends.—District fruit officers attended to specific and individual problems in their respective districts, with positive results in the majority of cases. In addition, extension campaigns of significance to the industry as a whole were conducted in respect of black spot control, *Septoria* control, white wax scale control, use of *Phytophthora* resistant rootstocks and associated techniques, drainage, underground and surface drainage systems, and irrigation method, including lay-out and farm design.

The improved red scale position in the Murrumbidgee Irrigation Areas and the Murray River districts has been due to the persistent efforts of extension officers. An amended technique is being recommended where oil sprays are employed for the control of yellow scale along the Murray. Diligent extension efforts by district fruit officers have resulted in growers' general acceptance of *Poncirus trifoliata* as a resistant rootstock for new plantings; so much so that all new orange plantings in the Murrumbidgee Irrigation Area and 80 per cent. of new orange plantings in the coastal districts have been on this stock.

Extension Service in Soldier Settlements.—District fruit officers gave special attention to the establishment and development problems of Soldier Settlements at Coomealla and Ellerslie where citrus plantings now amount to 3,300 acres. District officers act on a committee, formed to direct the development of the Coomealla area, with representatives from the Water Conservation and Irrigation Commission and the Rural Bank. For the Ellerslie Settlement being developed under the War Service Land Settlement Scheme, district officers act on the Directional Committee in which the Water Conservation and Irrigation Commission and the Department of Lands are also represented.

Trends in the Citrus Industry.—The widespread adoption of trifoliata as a citrus stock, mentioned in the 1953 report, has continued unabated. Nurserymen are still unable to cope with orders owing to difficulty in securing adequate supplies of virus-free budwood essential to the satisfactory propagation of this stock. Valencia buds conforming to trifoliata stock propagation requirements have been more readily available than Navel. That factor, and growers' desire to participate in the extended marketing period of this variety with its possibility of higher prices, have resulted in a marked preference for Valencia oranges rather than the earlier ripening Navel in new plantings. The preference for Valencia is least evident along the lower Murray River where the proportion is 60 per cent Valencias to 40 per cent. Navels.

Grapefruit trees have virtually disappeared from coastal districts, and a rapid decline in area planted is occurring in the Murrumbidgee Irrigation Areas. On the lower Murray and at Narromine some grapefruit planting is apparent, but growers are not enthusiastic because of increasing incidence of the virus disease "Stem Pit" and the difficulty in obtaining satisfactory winter prices.

The lemon position has also deteriorated, with the sharp falling off in demand by processors over the past two seasons. Growers are reducing their plantings in coastal districts where most of the State's lemons are grown. This decline is expected to continue until balance with processor demand is reached.

Citrus Research.

Citrus Wastage.—The superiority of sodium-ortho-phenylphenate dip treatment for control of green mould wastage of oranges has been confirmed. Efforts to overcome the treatment's liability to burn the rind are progressing favourably.

Further investigations of diphenyl-impregnated wraps have indicated that 30 mgm. of diphenyl per 10 inch x 10 inch wrap is the minimum desirable, against green mould. The industry has been informed of the extremely low content of diphenyl in some commercial wraps. The low content is due



(Division of Horticulture Photo.)

Portable overhead spray irrigation of citrus in coastal orchards, from water conserved on the property, is one of the trends.

both to faulty impregnation and/or to losses of diphenyl before the wraps are used. There are now two effective mould control treatments available to the industry: the dry method, involving diphenyl, for districts where fruit washing is not necessary; and the dip treatment for districts using the washing process.

Trials of diphenyl-impregnated fibreboard cartons and easelers have not been encouraging.

Lemon Storage.—Investigations have been extended to ascertain the influence of the orchard spray programme on the storage of dipped lemons. A dip of 2,4-D and salicylanilide has yielded very good storage of lemons, and preharvest Bordeaux spraying improved the storage of such dipped lemons.

Spore Load Investigations.—Steps in processing treatments are being studied for their effects on the numbers of mould spores on the fruit skin and the relationship of this spore load to subsequent wastage. Some skin sterilisation procedures actually increase the susceptibility of the skin to mould attack.

The methods of citrus preservation and cleaning evolved at Gosford Citrus Wastage Laboratory continue to be taken up by district packing houses. Officers give some supervision, and closely observe the outcome of practical application of the laboratory findings.

Citrus Improvement Committee's Activities.—Further areas of experimental trees propagated for the committee have been planted. Some 1,200 citrus were budded, and 1,800 trees from the previous season's budding are in nursery rows for distribution in the 1954 spring. The activities of the committee have been extended, from the successful outcome of trifoliata rootstock work to investigation of other stocks. The scions now include oranges, lemons, mandarins and grapefruit. Importations of a nucellar lemon and a new citrange from California have been made, to assist the work.

The committee has advised the Coomealla War Service Land Settlement Planting Committee on sources of trees. It also continued to receive inquiries indicating overseas interest.

Citrus Breeding.—Selections from the citrus breeding block at Griffith nursery have been propagated. Some of the grapefruit selections have also been used in the Citrus Improvement Committee's work arising from "Stem Pit" (virus).

Propagation of Citrus.—Extreme difficulty in producing satisfactory stands of seedlings of some citrus species, principally mandarins, has been resolved at the Gosford Citrus Experiment Station. It has been shown that shading of the seed beds is essential. This finding will prove most useful in the implementation of plans for furthering the Citrus Improvement Research programme and in other propagation work.

Hormone and Foliage Sprays.—Trials of urea at Yanco Experiment Farm showed that concentrations up to 20 lb. per 100 gallons can be used with comparative safety only in the late winter. Later sprays with lower concentrations caused a typical form of leaf injury.

In a trial of 2, 4-D to regulate lemon cropping, the comparisons were nullified by the poor set of the unsprayed trees, due to drought.

At Yanco Experiment Farm, 2, 4-D was confirmed as a stop-drop spray in Washington Navel oranges. The effect lasted for some two and a half months after application.

Irrigation Trial.—At Yanco Experiment Farm trees under reduced irrigation wilted late in the season, gave the poorest yields, produced strong autumn growth, and carried considerable second-crop fruit. Their fruit was of a lower acid test than that of non-wilted trees.

Rodent Repellent in Citrus Trees.—A new rabbit repellent, resin ethynol, caused bark splitting and gumming of citrus, followed by production of shoots from the butts.

Rootstock Trials.—In a trial in the Murrumbidgee Irrigation Areas, Valencia oranges on Rough Lemon were the most vigorous. Trifoliata, Cleopatra mandarins, Sampson Tangelo and Sweet Orange stocks also did well. Valencias on Canton stocks were well behind in uniformity and vigour.

The Narara trial comparing Rough Lemon and Sweet Orange stocks continued to show the superiority of Rough Lemon for size of tree and yield of fruit. During the summer drought the fruit on Sweet Orange stock was the more severely affected in sizing. Quality of Washington Navel and Valencia oranges from trees on Sweet Orange stock was better than that of fruit from the trees on Rough Lemon.

Gosford Citrus Experiment Station.—The Somersby section of the Gosford Citrus Experiment Station is developing. After considering the contour and soil conservation plans, surface and underground drainage have been effected and a plan has been drawn up for planting up a block of 20 acres with citrus trees next spring. The trees have been propagated at Narara headquarters to further the Citrus Improvement Committee work, and for the variety and arboretum collections. The funds position prevented progress of water storage for irrigation.

Narara Sub-station.—Seven acres of bearing citrus trees are under research projects. Several acres were devoted to the propagation of young trees for various research projects. A land-use plan for the retention of the citrus nursery has been drawn up. A Citrus Bud Selection block designed for the supply of pedigree buds is maintained at the expense of the Citrus Bud Selection Society of New South Wales.

Non-citrus work at the Narara Sub-station includes an acre of pecan varieties; 2 acres devoted to Phylloxera-resistant vines, from which the propagations are made; and the strawberry improvement project.

The urgent need at Narara Sub-station is water for irrigation. The nursery cannot function satisfactorily without adequate irrigation.

Coomella Horticultural Research Station.—Completion of the administrative building, machinery shed and fuel store was in sight at 30th June. Fencing requirements could not proceed due to non-arrival of steel posts. Water reticulation has not progressed, either for irrigation or domestic supply, reflecting the funds position. A spray irrigation system is necessary before any horticultural plantings occur. A land-use plan has been drawn up for citrus experiments on the first area to be fenced.

Yanco Experiment Farm Orchard.—Existing citrus plantings have been maintained. In the young citrus orchard where trifoliata trials are located, maintenance has been extremely difficult because of hopelessly inadequate irrigation facilities there.

Citrus at Griffith Viticultural Nursery.—Experimental citrus plantings located here have been satisfactorily maintained. They comprise a trifoliata rootstock strain trial; a Scaly Butt virus propagation trial, using Washington Navels orange as the scion; and a citrus breeding section. Valuable information is being derived.

N.S.W. Co-operative Bud Selection Society.—The Society has been assisted by an inspection service to further the Citrus Parent Tree Registration Scheme, inaugurated last year. Progress of this scheme during the year has helped to increase the quantity of buds available for propagation in commercial nurseries. The Society was also helped to locate alternate sources of bud supply when normal sources were adversely affected by dry weather. The trees maintained by the Society at the Narara section of the Gosford Citrus Experiment Station provided some 15,000 buds for propagation on stocks other than trifoliata.

Exchange of Citrus Plants and Seeds.—Small quantities of trifoliata seed were forwarded to the New Zealand Department of Agriculture and to Kenya, South Africa. Late Emperor citrus buds were forwarded to the Citrus Research Station, Neilspruit, South Africa. Budwood of Troyer Citrange and Nucellar strains of lemons were received from the U.S.A., and budwood of Norris and Hamlin varieties of oranges from South Africa. This imported material has been propagated in quarantine at the Botanic Gardens.

Banana Industry.

Although the year's rainfall total approximated normal, the incidence was erratic. Growing conditions were affected accordingly. At the end of February, 1954, the worst cyclone in the memory of banana growers caused damage and losses estimated at £2,000,000.

Production was considerably in excess of last year's until February but the cyclone's effects were clearly reflected in subsequent months. Bananas marketed totalled 1,877,751 cases from 21,997 bearing acres, an average of 85.3 cases per acre. Prices were firm for the greater part of the year, with a heavy recession during January and February and a steep increase in April. The cyclone's effects will be reflected in prices until October, 1955.

With the present acreage of bananas (28,164) the industry must closely watch its rate of expansion, to avoid uneconomic conditions. Large areas of low producing bananas should be kept under attention with a view to their removal as soon as the industry returns to normal after the long period of relatively low production.

The Department has enjoyed the complete co-operation of the Banana Growers' Federation. The Federation has contributed directly to the Bunehy Top Control Campaign, research and demonstrational work at the Duranbah Experiment Plot, and extension work—particularly at district field days.

Extension Service in the Banana Industry.—Departmental recommendations continued to be well received. Adoption of better cultural practices increased. The marked expansion of supplementary irrigation of bananas, encouraged by the success of the 2-acre demonstration initiated at Duranbah Plot in 1947, is an instance. Recent surveys indicate that 882 acres of bananas are now under supplementary irrigation. Similarly, voluntary control measures for rust thrips and leaf-spot have increased considerably. Figures for the previous year indicated that 478 acres of bananas were being treated, by 123 growers, but this year's figures indicate that 2,024 acres are now being treated by 215 growers.

Banana rust thrips has become a serious pest in the northern areas. Surveys show widespread distribution and heavy infestations in certain localities. Market reaction to rust-affected fruit has been so definite that up to 30s. per case has been lost. The Banana Growers' Federation has now undertaken to finance equipment and materials required for a vigorous extension campaign in the coming season under the Department's direction. In addition, the district entomologist has an extensive investigational programme under way. Important modifications of the present control programme may arise from his work in co-operation with Division of Horticulture.



(Photo from Coff's Harbour Office.)

The banana plantation on the background hillside and the "flying fox" wiring for despatch of the bunches to the shed, illustrate the terrain typical of this north coast industry.

Plastic bunch covers have now been generally adopted throughout the industry as a direct result of our Duranbah investigations. An estimated half million plastic covers are now in the field. Our work with plastic bunch covers has attracted the interest of other banana-producing countries. Experience is being exchanged.

The Duranbah Plot figures for production and costs provided convincing factual data for the industry. This year from 1 acre of bananas the net return was £344 from 347 cases. These figures reflect the heavy production assured by irrigation.

The Eighth Annual Field Day at Duranbah Demonstration Plot again attracted 800 growers from north-west localities and Queensland. The attendance of some 800 people annually is a clear indication of the industry's appreciation of Departmental efforts. Two well-attended Field Days were also organised in the southern areas, and keenly appreciated by growers. Press and radio have been utilised extensively by officers. Excellent co-operation is enjoyed in those fields.

Increasing numbers of new growers are entering the banana industry each year, some 460 new growers commencing during the past year. The advent of these new, inexperienced growers makes heavy demand on extension services, and whilst we are making strenuous efforts to meet this demand, it may only be met by additional extension staff.

Flood Relief.—After the disastrous north coast flood last February, local horticulture officers co-operated with the State Flood relief Committee and Rural Bank in inspecting properties and supplying information and reports on 150 requests for grant relief and 107 applications for loans in the Tweed and Brunswick districts.

Regulatory Services in the Banana Industry.—Regulatory work was maintained at a high level. Three prosecutions were instituted and convictions recorded for breaches of the Bunchy Top regulations. Close attention has been paid to the grading regulations, and frequent effective inspections have been carried out at loading stations.

Bunchy Top Control Campaign.—Bunchy Top control was maintained in co-operation with the Banana Growers' Federation. Bunchy Top increased slightly with 0.11 infected plants per acre for the 28,165 acres, due to local outbreaks in the lower Richmond and the southern Tweed districts. The outbreaks were dealt with effectively. It is increasingly difficult to reduce Bunchy Top below recent low figures. The disease does not now appear in confined areas within a plantation. If many affected plants are found in a plantation, they are usually distributed over a large area. It is not then possible to apply the effective measure of eradicating worst infected areas within a plantation to eliminate the source of infection. Alternative measures and trials are projected for next summer.

Banana Weevil Borer (*Cosmopolites sordidus*).—Banana weevil borer is still an important economic pest, but insistence on compliance with the control regulations is having the desired effect.

Squirter and Black-end Diseases.—These diseases are no longer a serious problem in view of compulsory dipping measures. Increasing numbers of growers now treat their fruit throughout the year, but the majority conform strictly to the compulsory period.

Tropical Fruit Research.

Irrigation and Fertiliser Trial.—Interesting results have been obtained from an irrigation versus fertiliser project. A plot which received irrigation minus fertiliser was compared with a plot receiving fertiliser but no irrigation. The irrigated plot produced the equivalent of eighty cases per acre more than the non-irrigated plot and, in addition, matured first bunches eight weeks ahead. These figures, if extended to commercial areas, would be highly significant. The future of this trial will be watched with interest.

Plastic Bunch Covers for Bananas.—Investigation of plastic bunch covers for protection of winter maturing fruit was expanded to include temperature effects but the trials were seriously handicapped by the adverse winter. It is not anticipated that much beyond durability data will be available.

Trace Elements in Bananas.—Since little is known of the influence of trace elements on bananas, two trials were initiated this year. One is located on the Tweed and the second at Coffs Harbour. Further trials are projected.

Tropical Fruit Research Stations.—Duranbah Demonstration Plot remains as the only available area for investigational work in tropical fruits. This Station is being used to very good effect, but larger areas are needed for an expanded research programme. Two properties, totalling 123 acres, have been purchased at Alstonville, to be developed as a Research Station. Work may commence there in 1954-55.

Supplementary Irrigation.—Investigation of supplementary irrigation of bananas continued at Duranbah Plot. Various types of irrigation equipment were tested there throughout the year.

Pineapples.—An off-flavour in frozen pineapples has been investigated over the past few years. The off-flavour development appears to reflect the maturity of the fruit and, to a lesser extent, the method of packing.

Pome Fruit Industry.

The season's apple crop was an all-time record at 2,400,000 bushels, approximately 1,000,000 cases more than any of the previous few years. It reflected a very favourable season in most districts, improved pest and disease control measures, and new areas coming into production in higher producing districts.

Trends in the Pome Fruit Industry.—The over-all picture of pome fruit growing in N.S.W. shows a gradual decline or static position in certain areas, including Young, Bathurst, Penrose and Tallong, but on the other hand, a marked expansion in such main apple and pear districts as Batlow and Orange and, to a lesser extent, the northern areas near Uralla and Armidale. In the Murrumbidgee Irrigation Areas more interest is being taken in apples and new plantings are likely there. This season's Granny Smith crop in the M.I.A. was a record. More vigorous rootstocks and better pest control methods have considerably changed the outlook in the irrigation areas. Expansion of coastal plantings continued in the Oakdale and Bilpin areas which favour earlier varieties completely harvested by March.

Apple production is gradually assuming a much more stable and satisfactorily economic character, in that most of the mid-season and late maturing varieties are being centred in areas best suited by climate and soil to produce them, whilst most of the earlier varieties are now being produced in coastal and near metropolitan areas.

Big advances have been made in recent years in spraying equipment, and pome growers are increasingly aware of the need to use efficient equipment, both to control pests and diseases and to reduce production costs. Costs of production, labour constituting a major part, have so risen in late years that orchards to-day become an uneconomic proposition unless very expertly managed. The resultant present trend is to limit holdings to an acreage which can be handled by the grower, with seasonal peak help. Growers are increasingly turning to efficient mechanisation to keep costs reasonable.

Extension Work in Pome Fruit Industry.—Fruit officers were heavily engaged to meet requests for advice in all phases of pome production and marketing. Restrictions on mileage curtailed visits to individual orchards, but officers took advantage of country press and broadcasting stations' facilities and of local growers' organisations, in disseminating advice. Newspapers and radio stations have been very co-operative.

The use of subterranean clover to conserve and improve the natural soil fertility was campaigned in the Western and New England regions. The examination of sixty-two orchards at Kentucky was completed, and reported on to the Rural Reconstruction Board.

Willigobung Soldier Settlement.—The Willigobung Soldier Settlement at Batlow continued to make very satisfactory progress. The original tree plantings made good headway, and several settlers have extended their areas. In most cases settlers secured good returns from vegetable crops, particularly potatoes. All blocks are now occupied, and cottages have been or are being erected on the blocks. In general, the settlers appear to be satisfied with their prospects.

Demonstrational Orchard, Armidale University.—The Demonstrational Orchard, planted in co-operation with the Armidale University, progressed very satisfactorily. It is developing into a very valuable and interesting project. The Armidale district fruit officer acts as adviser to the University in all matters pertaining to this demonstrational orchard, for which the Department supplies the trees.

Pome Fruits Research.

Fruit Thinning Sprays.—Experiments centred on naphthalene acetic acid for fruit thinning in this heavy crop year. At 10 parts per million this hormone was found suitable for most varieties of apples, but ineffective on pears. Considerable increases in fruit size were obtained. Studies were initiated in conjunction with the Plant Physiology Unit, Botany School, University of Sydney, to ascertain the relationship of hormone thinning to the cell division and cell enlargement phases of fruit growth.

Pre-Harvest Drop Prevention Sprays.—New hormone sprays were tried for this purpose. On Delicious apples the results indicated that 2,4,5-TP will displace the commonly used naphthalene acetic acid spray to prevent drop. Only 2 per cent. drop resulted after four weeks of 2,4,5-TP at 10 p.p.m., whilst 20 per cent. occurred with naphthalene acetic acid. Another substance, 2,4,5-TA, was immediate in effect. The first named substance has the advantage of a less exacting time of application and a stop-drop effect twice as long as that of naphthalene acetic acid. The newer hormone sprays advanced the fruits' maturity. Maleic hydrazide was

found not to counteract this effect, as recorded elsewhere. At Yanco Experiment Farm, 2, 4-d at 4 p.m., reduced the drop from 10-30 per cent. to 2-4 per cent.

Urea Foliage Sprays.—It was confirmed that urea foliage sprays which improved colour and health of foliage of apples were compatible with lime sulphur. The two sprays can therefore be combined where necessary, to effect a saving in cost and application.

Apple and Pear Breeding.—The exceptionally heavy cropping at Bathurst Experiment Farm facilitated the observations of cross-bred apple seedlings and top-worked selections. A few of the latter reached the stage of final selection for trial as new varieties, whilst the majority were finally marked for discarding. In new selections resistance to the main apple diseases, black spot and powdery mildew, were favoured.

Pear seedlings also fruited heavily, facilitating heavy discard, and the selection of a few promising types for orchard trial.

Apple and Pear Storage Investigations.—Experiments are now being conducted to ascertain the effects of the different rootstocks and the various hormone and urea treatments mentioned above on storage behaviour of apples. The fruit was supplied from the experimental blocks at Bathurst Experiment Farm. Gas storage of Granny Smith apples is also being investigated.

Pears have shown some beneficial effect of a short delay before storage. This is being investigated more fully, whilst the recommendation remains to cool store pears as soon as possible after packing. Observations of mould wastage in Winter Cole pears continued, and show definitely that careful picking and packing considerably reduce decay in storage.

Rootstocks.—Trees in the rootstock experiments at Bathurst Experiment Farm all fruited heavily. Imported Merton and Malling-Merton rootstocks and Departmentally raised clones are being multiplied for trial with Northern Spy at Narara. Further Malling-Merton clones are to be imported, as they have been bred for woolly aphid resistance. Pear rootstock D6, originated by the Department, continued to excite overseas interest, and plants are being sought by Canada and England.

Bumpiness of Williams Pears in the Murrumbidgee Irrigation Area.—Yanco Experiment Farm investigation confirmed that lop-sided fruit is associated with one-sided, seed development. Increased yield and percentage of canning-sized, quality fruit resulted from frequent irrigation in this investigation.

Stone, Dried, Berry, and Miscellaneous Fruits and Nuts.

Extension Work in Stone Fruits, etc.—Fruit officers' advice and guidance in all aspects of stone fruit production and marketing were sought consistently. Field Days and demonstrations were organised to expand the number of extension contacts in the various districts, and increased use of the press, the radio, films, and correspondence, was necessary to fulfil the extension obligations.

The demand in Murray River districts for fruit officers' assistance in farm design, redesign of old irrigation systems, and drainage, was accompanied by a sharp increase in extension work concerning planting, pruning, and care of young vines, among the many new settlers in the Coomealla and other Murray irrigation districts.

The appointment of a fruit officer at Young has considerably increased extension work there, with special attention to disease control. In the Murrumbidgee Irrigation Areas, special measures were taken to advise growers concerning oriental peach moth, brown rot and rust control, Murrumbidgee Irrigation Area quarantine measures, irrigation needs, and spraying techniques. In most districts there was wider adoption of supplementary irrigation, underground drainage and contour planting.

Stone Fruit Research.

Cherry Breeding.—Trees at Orange top-worked to selections fruited well and enabled the final selection of a few for further trial as new varieties.

Peach Varieties and Breeding.—Data on improved growth and fruiting characteristics of the newer canning peach varieties were collected at Yanco Experiment Farm. Fairless showed up as an excellent mid-season peach. Seeds of Wight and Windra peaches have been planted at Yanco for selection of useful canning types. The Yanco trial of Victorian varieties has been extended by several varieties which were top-worked in the orchard in 1953.

Peach Pruning Trials.—Lightly pruned canning peach trees again outyielded the heavily pruned trees, the respective yields being 12.2 and 2.5 tons per acre. However, the former are now obviously slackening in vigour.

Internal Breakdown in Apricots.—In trials of the effects of irrigation and sulphate of ammonia dressings on this important defect of apricots in the Murrumbidgee Irrigation Areas, the least breakdown occurred with a high nitrogen and early

wilting combination. Highest incidence was with a high nitrogen and no wilting treatment. High nitrogen also delayed maturity by seven to ten days.

Zinc sulphate failed to reduce breakdown, but increased the yield of apricots by some 25 per cent. Spraying with 2, 4, 5-T did not reduce breakdown, but hastened maturity by some fifteen to sixteen days and caused some foliage injury. Lime and superphosphate in separate plots slightly reduced the incidence of breakdown.

Apricot Breeding.—Parental material has been established in the arboretum at Yanco Experiment Farm. With the object of obtaining late maturing varieties, Skuse's Late and Hennig's Late were introduced from South Australia. Seedlings of a number of varieties will be planted for selection purposes.

Urea Foliage Sprays.—It was found that urea at 10 to 20 lb. per hundred gallons can be used on peaches with reasonable safety. Slight burn occurred, but recovery was rapid.

Chemical Thinning Sprays.—Hormone, fruit thinning spray trials were initiated this season. Maleic hydrazide did not appreciably affect blossom thinning on canning peaches. At 750 p.p.m. it was severe on some dessert peach varieties and Angelina plums, and caused foliage injury. Naphthalene acetic acid gave negative results with plums, peaches and nectarines.

Green Manure Trials.—Trials at Yanco Experiment Farm were continued to determine the best green manure crop mixtures for the Murrumbidgee Irrigation Areas. Yields of 30-40 cwt. of dry matter per acre were general for oat-legume mixtures this year. Peas alone and oats alone yielded well, but pure vetch stands were poor. This season's work confirms that sowing rates of 20-40 lb. of oats with 25 lb. of vetch or 56 lb. of field peas, or pure oat or pure field pea stands are satisfactory for green manure purposes.

New Dessert Peach Varieties.—Three new varieties of early maturing dessert peaches, Earlyvee and Somervee from Canada and Redhaven from United States of America have been introduced and raised under quarantine. They are now being propagated at Bathurst Experiment Farm and, providing no disease develops, trees will be established on Experiment Farm orchards and then located in various districts for trial.

Canning of Freestone Peaches.—Further work in co-operation with the C.S.I.R.O. on freestone peach canning includes a study of the technique of processing this class of peach, and tests to determine varietal suitability. Special attention has been given to the new variety Rio-Oso-Gem.

Pre-harvest Drop of Prunes.—At Yanco Experiment Farm where the effects of differential irrigation on pre-harvest drop in prunes are under examination, three different irrigation treatments were used. Two limited the soil moisture available to the trees at different periods of fruit development after New Year. Pre-harvest drop was light over all treatments but late wilted trees showed least with 4½ per cent. drop.

Prune Stock Trials.—Some prune stock trials are satisfactorily established in the Young District and in the Murrumbidgee Irrigation Areas. The trees are now coming into bearing and will soon be yielding useful information. Varieties and strains are also being tested.

Prune Tree Nutrition.—A fertiliser trial has been commenced in the Young district to obtain information on the effects of nitrogen levels on (a) blossoming and fruit setting and (b) general vigour. Useful data on fruit setting, growth, yields and quality of fruit have been obtained. The treatments will be continued for some years.

Pre-Drying Assessment of Prune Quality.—Considerable variations in prune quality occur due to seasonal conditions or disease infection. In preliminary investigations during harvesting to determine whether prune quality could be accurately assessed before drying it was shown that useful indications could be obtained with a refractometer. However, the method could not be used exclusively for the purpose of quality grading individual crops, because of sampling difficulties.

Apricot Pruning.—Initial work at Yanco Experiment Farm to devise a method of pruning apricots under Murrumbidgee Irrigation Area conditions, which will eliminate excessive water shoot development, indicates that where water-shoots are left long, production of strong growth is subsequently reduced, although these growths did not spur well.

Cherry Stocks.—Trials incorporating Mazzard, Mahaleb and Kentish types as well as strains from East Malling have been established, to find better stocks for commercial cherry varieties. The relationship between stock and the incidence of bacterial canker is also receiving attention. A strain of Mazzard cherry claimed to be resistant to the disease is being tested as a stock both in ordinary nursery propagation and by planting *in situ* to be reworked to commercial varieties after the very susceptible period is passed.

Sulphite Dip for Sultanas.—Fruit officers have been associated with Merbein Research Station in developing, testing and introducing the new sulphite dip for sultanas. This dip gives greater protection from mould infection while the fruit is on the racks. It also hastens drying. It will be particularly useful in such districts as the mid-Murray areas where the drying season is of shorter duration.

Cincturing Currants.—Tests and demonstrations of hormone sprays in lieu of cincturing currants were successfully carried out in association with the C.S.I.R.O. at Woorinen on the Murray River. Spraying with 2,4-D, which is economical and effective, is now likely to become standard practice.

Nursery Practices.—Fruit tree propagation investigations include tests of plastic strips, in lieu of raffia, for tying buds and grafts. The material has given promising results. Further work will be carried out including tests of rapidity of calousing.

Strawberry Improvement.—A strawberry improvement project at Narara involves the raising and testing of cross-bred seedlings. Last year 500 seedlings were under observation for selection, and plants of nine previous selections were tested in small plots. Two of these selections have now been placed with commercial growers for final testing. If satisfactory they will be released for commercial planting next year.

Other strawberry projects include investigation of the use of hormones for weed control, and spray treatments for virus vector control.

Berry Fruits.—Desirable cultural practices for trailing berries such as Boysenberry, Youngberry and Loganberry, have been determined by trials. It is now possible to give standard recommendations for the growing of these fruits, and better yields are being obtained by commercial growers who adopt them.

Cropping Habit of Pecan Nuts.—Investigations of factors responsible for fruit production in pecan nuts included studies of catkin production and pollen ripening in relation to stigma receptivity. The desirability of cross-pollination to increase commercial yields is also under attention.

Hazel Nuts.—Thirty varieties of Hazel Nuts are under trial at New England Experiment Farm. Details of general characteristics, growing habits, and yields, have been recorded for several years. The unsatisfactory yields so far obtained seem most likely due to imperfect pollination. This aspect is now being studied.

Macadamia Nuts.—A Macadamia nut improvement project has been commenced in co-operation with the Queensland Department of Agriculture. Selected types will be further studied. Some 102 trees have been selected for propagation as potential parent trees.

Quick Freezing.—Arising from the discoloration of quick frozen peaches and apricots when thawing out, experiments on the effect of varying amounts of antioxidants on quality and storage life were continued at Homebush Laboratory. In apricots it was found that sulphur dioxide in small amounts gave satisfactory control of discoloration and did not impair the flavour of the product.

Work on the freezing of berry fruits was continued in conjunction with the Tasmanian Department of Agriculture and C.S.I.R.O. Regional Laboratory.

Wine and Table Grapes.

Officers gave advice to wine grape growers and wine makers by personal visits, press articles and broadcasts. A demonstrational wine grape plot at Molong is progressing satisfactorily.

The New South Wales wine grape crop was very satisfactory. The Hunter River district produced a larger crop than in recent years and the Murrumbidgee Irrigation Areas' crop of 25,022 tons was a record. Near to five million gallons of wine, including distillation material, were made. Unfortunately, cool and wet weather conditions just prior to and when the vintage commenced, affected the quality of the wine. In the Hunter River district many wines were only mediocre.

Wine grape prices slumped badly in the Murrumbidgee Irrigation Areas. The serious drop in prices alarmed growers and is disturbing the wine industry.

Research:

Hormones for Grape Setting.—Although favourable results with PCPA for fruit setting have been reported in other States, New South Wales trials with three salts of PCPA have given negative results. Leaf abnormalities similar to the typical 2,4-D injury followed application of PCPA at 30 p.p.m.

Packing Materials.—In terms of mould wastage and general appearances of bunches, dust-free Mountain Ash sawdust was found to be better than insignis pine sawdust and at least equal to the granulated cork normally used. However, trade

reports from Singapore indicated a buyer preference for cork packing. These tests are being conducted in collaboration with the C.S.I.R.O. Division of Forest Products.

Vine Spacing and Stock Affinity Trials.—At the Griffith Viticultural Nursery, vine spacing trials and Phylloxera-resistant stock affinity trials were affected by salt troubles. The value of these trials has been jeopardised.

Griffith Viticultural Nursery.—Funds were not available for tile drainage at Griffith Viticultural Nursery. Gradual increase of salt trouble is seriously affecting some of the "mother" vines which produce cuttings for propagating Phylloxera-resistant stocks. The demand for Phylloxera-resistant rootlings is steadily increasing. This season the supply will not be sufficient to satisfy vignerons. Some 129,000 cuttings of resistant stock were planted, and it is estimated that there will be about 70,000 rootlings available for distribution. Some 130,000 cuttings will be made for planting next spring.

Narara Sub-Station.—From two acres of vines retained to supplement the propagation of Phylloxera-resistant vine stocks some 53,000 vine cuttings were made and planted during the season; and 17,000 rootlings were made available to growers.

Fruit Preserving: Extension Service.

A Fruit Preserving Instructor was appointed in January, filling a position which had been vacant for many months. The officer gave a number of lectures and demonstrations, at field days, and meetings of Agricultural Bureau branches and women's organisations. Numerous inquiries relating to fruit and vegetable preservation were dealt with by correspondence.

DIVISION OF ANIMAL INDUSTRY.

The staff position deteriorated seriously due to the resignation of one District Veterinary Officer, one Special Veterinary Research Officer and seven Veterinary Officers. Consequently the Division's work has been impeded.

Disease Incidence.

The following disease matters were of particular importance:

- Additional outbreaks of contagious pleuro-pneumonia in cattle in the central west and Riverina.
- Further evidence of leptospirosis in cattle and pigs in various districts.
- Increased tuberculin testing of cattle following the introduction of the Cattle Compensation Act.
- Diagnosis for the first time of malignant catarrh in cattle. It was diagnosed on a Wagga property. Suspected cases occurred in Gundagai and Young districts.
- Diagnosis of vibriosis in a Cumberland dairy herd.

Anthrax.—Thirteen outbreaks were reported in the recognised anthrax areas involving the Moree, Bourke, Canonba, Condobolin, Hillston, Molong, Narrandera and Albury Pastures Protection Districts. Twenty-one thousand, two hundred and eighty-four head of stock were placed under quarantine. Deaths totalled 354 sheep, 33 cattle and 4 pigs. Routine preventive inoculation was carried out on many holdings where the disease had occurred in previous years.

Bovine Pleuro Pneumonia.—In comparison with last year the number of outbreaks was greatly reduced. Only twelve outbreaks were recorded. They involved 827 head of cattle. In addition, however, more than 6,000 head of in-contact cattle were traced and in many cases bled and vaccinated. There were actually three distinct outbreaks. One was closely linked with outbreaks which occurred in the previous year.

In October, 1953, outbreaks were detected in Victoria and Albury in a line of cattle which had passed through Wodonga Saleyards and had originated from the Bourke district. Subsequent inquiries revealed one case in similar cattle which remained at Bourke and it was ascertained that the cattle came from the Wanaaring district in June, 1953, where they had been in contact with cattle introduced from Queensland in 1952. Several small lots of in-contact cattle ex the Wodonga Sale were traced, but no further outbreaks occurred.

In December, 1953, a case was detected in the Young district. The cattle had come from a Molong property. Two further outbreaks were detected at Molong. The disease had been present on that property for several months. The source of infection of this series of outbreaks was considered linked with those of 1952-53. As the result of the movement of cattle from these properties through the Cowra, Wagga and Tumut Sales, several hundred in-contact cattle had to be traced. Fortunately only one further outbreak occurred and this was in the Gundagai district.

In February, the disease was again reported from Victoria, in New South Wales cattle which passed through Wodonga Saleyards some three months earlier. Fortunately, only three outbreaks occurred in New South Wales as the result of cattle coming in contact with the infected cattle at the Wodonga Sales but it was necessary to trace all saleyard in-contacts from seven Wodonga Sales. The New South Wales cattle



(Photos from Wentworth office.)

In the far south-western corner of New South Wales, soldier settlers are converting virgin country to irrigated orchards, with guidance by Departmental field officers.

which caused these outbreaks had originated from the Pilliga district where they had been boxed with a mob of cattle that were under surveillance restrictions. This latter mob had been involved in an outbreak in the Coonamble district and had been released from quarantine in May, 1953, without being subjected to test prior to release. The mob ex-Coonamble was subsequently traced and located in the Moree district. Two animals were located at Burren Junction and found to be infected. Those at Moree were subsequently consigned for slaughter, and seventeen chronic cases were detected on post-mortem examination.

The experiences with this particular outbreak confirmed the need to insist on all cattle involved in outbreaks being tested prior to release from quarantine. This is now routine policy. All cattle involved in the last few outbreaks have been so tested with very satisfactory results. Only one animal showed any reaction. On slaughter it had only pleural adhesions. Most properties have been released from quarantine restrictions.

During the year, 1934 sera samples were submitted to the complement fixation test, and thirty-nine positives were detected. In addition, 1,303 sera were submitted from animals for export, interstate or overseas, or for introduction into Pleuro Protected Areas within the State.

Brucellosis (Cattle).—Under the Departmental Brucellosis-free Herd Scheme, eighteen registered stud herds and eight non-stud herds were tested involving 2,134 head of cattle. There has been a steady reduction in the number of herds listed. Many owners have preferred to undertake Strain 19 vaccination and it has been found impossible to maintain a Brucellosis-free Herd in conjunction with vaccination of heifers. Many of the cattle retain a positive titre for long periods after vaccination. Strain 19 vaccination is still increasing in popularity. Vaccination is normally carried out by practitioners. Departmental officers do it where no practitioners are established.

Tuberculosis in Cattle.—(a) Testing under the Milk Board Scheme is summarised in the following table:—

Area.	Number Tested.	Number Reactors.	Percentage Infected.
Metropolitan	19,821	231	1.16%
Blue Mountains	120	1	.83%
Wollongong	969	12	1.23%
Hunter District	2,302	8	.35%
Erina District	638	—	.0%
Newcastle District	1,230	4	.33%
Total	25,080	256	Av. %: 1.02%

Incidence of T.B. was less than in the previous year.

(b) **T.B.-free Herd Scheme.**—Forty-nine registered stud herds and 104 non-stud herds involving 11,287 head of cattle were tested under the Scheme, an increase on the previous year.

(c) **T.B.-protected Areas.**—The annual test of cattle in the twenty-one Protected Areas showed the incidence of T.B. still at a very low figure. A total of 4,610 head of cattle was tested and seventeen reactors were detected. Broken Hill Protected Area, in which T.B. incidence was high, is now free of infection.

(d) **Miscellaneous Testing** further increased, particularly on the north coast, where approximately 46,000 head were tested, mainly by practitioners.

The total number of cattle tested was 113,000 as compared with 91,000 in 1952-53, and the incidence of infection was 4.56 per cent., compared with 4.33 per cent. in the previous year.

T.B. in Pigs.—Two thousand two hundred and twenty-four pigs were submitted to test, including 2,084 at various government institutions. The incidence of infection at the institutions was reduced to 4.4 per cent. whilst 23 per cent. of pigs tested for private owners reacted. The testing of two institutions has given very disturbing results because of the large number of pigs positively reacting; but when a number has been slaughtered, T.B. lesions have not been detected. Investigations have not revealed the cause of these apparent non-specific reactions.

John's Disease.—Three herds in which outbreaks occurred during 1951 and 1952 were still in quarantine at 30th June, 1954. An imported cow which arrived in Australia in July, 1953, developed suggestive symptoms a few months after arrival, but the disease was not confirmed until June, 1954. Arrangements were then made for the animal to be destroyed.

Trichomoniasis.—Eight further cases were confirmed in the following Pastures Protection districts:—Moss Vale (3), Grafton (3), Maitland (1), Casino (1).

The policy of slaughtering infected bulls has been continued. This, together with other control measures appears to be achieving satisfactory results. Provision has been made under the Cattle Compensation Act for the payment of compensation.

Vibriosis.—Vibriosis was diagnosed in a Cumberland dairy herd with a history of infertility for some months. This is the first definite diagnosis of vibriosis in this State, although twice previously it was suspected. Control measures undertaken are similar to those adopted with trichomoniasis.

Sterility.—Sterility in dairy cattle remains one of the most serious problems affecting the industry. Additional investigational work is greatly needed.

Brucellosis (Swine).—No outbreaks were reported. Under the Brucellosis-free Herd Scheme (Swine) twenty-three registered stud herds and sixteen non-stud herds were tested, involving a total of 854 pigs.

Avian Tuberculosis.—The number of detected cases of avian T.B. has increased. There are twenty-three properties in quarantine distributed as follows:—Wagga (12), Albury (5), Narrandera (3), Corowa (1), Gundagai (1), Moss Vale (1).

More stringent control measures have been adopted and check inspections on some previously infected holdings have shown that the disease has been eradicated.

Piroplasmosis.—This condition is dealt with in detail under "Board of Tick Control".

Leptospirosis.—Specimens from cattle and pigs were examined for *Leptospira* spp. to further the investigation of incidence. Positive reactions in pigs to *L. pomona* and *L. mitis* were found in the Armidale, Orange and Cumberland districts, associated with abortions, retained afterbirth and neonatal mortalities. Positive reactions to *L. grippotyphosa* were recorded frequently in the south-east portion of the State.

On an Armidale property four cows were tested after abortion. Two were positive for brucellosis and leptospirosis; and two were positive for leptospirosis only. The significance of the association will be investigated.

Blackleg in Cattle and Sheep.—The disease caused minor losses in young cattle in the coastal districts. In only two cases were vaccinated stock involved and then only a few animals. Sporadic sheep mortalities occurred inland, always associated with routine operations such as shearing, inoculating, etc., done under unhygienic conditions.

Black Disease.—Losses persisted throughout the year on the tablelands and slopes but no major outbreaks were reported.

Tetanus.—Each month there were sheep losses associated with routine mulesing, shearing, etc., under unhygienic conditions. A similar outbreak in pigs was recorded.

Photosensitisation.—Several outbreaks occurred in the Orange and Armidale districts in sheep grazing aphid infested trefoil. In one examination, fluorescent pigments were detected in the aphid but not in the blood. *Aphis craccivora* was involved in this case. *Panicum effusum* was responsible in two outbreaks.

Enterotoxaemia.—This is now one of the diseases best known to graziers. Vaccination is done on properties where the disease has caused losses in the past or at the first appearance of the disease. Minor losses coincided with the spring and autumn lambing. In one outbreak stinkwort and in another, lack of water, created bowel conditions suitable for the proliferation of the organism. Merino wethers were involved in both cases. The condition occurred again in goats at Condobolin.

Blowfly Strike.—Patchy outbreaks and low incidence on the slopes and tablelands through the spring, trailed off during summer. There was a peak of activity in March and the trouble persisted at a low level into winter. Dieldrin was used in a trial during a fly wave in the Orange district. It gave seventeen weeks' protection whilst 85 per cent. of sheep in the control group were struck.

Footrot and Foot Abscess.—The pandemic of last year in the central and southern districts eased during spring of 1953. Dry conditions thereafter prevented major outbreaks.

A conference of C.S.I.R.O. and State Departmental veterinarians at Young in August, 1953, formulated a standard plan of treatment and control for extension to graziers. Chloromycetin was introduced as a drug of promise by the C.S.I.R.O., and subsequent trials in the respective States confirmed its very high efficiency, but high cost restricts it to the worst cases not readily cured by the standard drugs. All control measures previously recommended, including adequate paring of the feet, must remain the basis of any eradication policy.

Mycotic dermatitis.—Only a few cases were recorded in sheep. It was seen on two Grafton properties in cattle, in which it is rare.

Internal Parasites.—Internal parasitism caused unthriftiness and mortality in all species, although the incidence in sheep and cattle was lower than recorded in recent wetter years. Infestations with black scour and nodule worm were confined to the recognised limits. The dry summer and autumn resulted in sheep and cattle crowding on to areas of greener feed, and barber's pole worm infestations were more widespread than usual, extending into the winter rainfall areas. The same conditions resulted in considerable losses from acute and chronic fluke disease in sheep and cattle. Winter losses from acute fluke infestation were particularly prevalent on the northern tablelands. There were heavy condemnations of livers at abattoirs. Round worm infestations of pigs were commonly seen, particularly on the coast. Spargana were seen in feral pigs slaughtered at Wagga. The tapeworm *Metroloathes lucida* was found in a turkey in the Cootamundra district and identified at Glenfield. This is the first record of its appearance in Australia.

Specimens were submitted from dingoes, foxes, snakes and a lizard for identification of internal parasites. Worms were found in all but the lizard. The hookworm, *Uncinaria*, was found in a fox in the Armidale district. This parasite is rarely seen outside the southern States and southern N.S.W.

Swine Dysentery.—Four outbreaks were recorded; three in the Newcastle district, one in the Cumberland district. Recognised methods of treatment again proved satisfactory.

Infectious Pneumonia of Pigs.—A few outbreaks occurred. Quarantine was necessary only in two. Virus pneumonia was suspected in many cases.

Spirochaetosis.—The disease was reported from inland districts. Vaccination is effective but many who keep poultry as a sideline do not know of it.

Myxomatosis.—The disease overwintered. Many inoculations were done in spring and summer to promote its spread. However the disease did not become active until March. It caused good kills, though not in plague proportions, through March and April, 1954. It waned in May, and in June was only seen on the coast.

Mite Infestation of Poultry.—The mite *Epidermoptes bilobatus* caused irritation of the skin, and deaths, in turkeys on a Cumberland property. This is the first appearance of the parasite in Australia.

Malignant Catarrhal Fever.—This was the suspected cause of cattle mortalities on Gundagai properties in August and November. Practitioners in Young and Wagga districts reported on two suspected cases which appeared typical of the disease. In no case was the diagnosis confirmed until the Wagga practitioner encountered a later case and histological examination of specimens at Glenfield revealed lesions which confirmed the diagnosis. This was the first confirmed diagnosis of the disease in Australia.

Psittacosis.—The disease was diagnosed in an aviary in the Cumberland and in the Cootamundra district. In the latter case the owner contracted the disease in a severe form. Several inspections were made of aviaries in the Cumberland district where the disease had occurred in the past, or as part of investigations following the appearance of the disease in a human.

Perosis.—This was diagnosed in ducklings in the Goulburn area and is our first record of the disease in ducks. Perusal of overseas literature shows it to be a rare occurrence.

Bovine Cysticercosis.—Cysts of *Cysticercus bovis* were found in a beast slaughtered at Homebush which had come from Albury. They were found, too, in steak purchased at Sydney. The carcass in this case probably came from Queensland.

Ephemeral Fever.—A field diagnosis was made when six dairy cows were affected with typical symptoms on a Cootamundra property. The diagnosis is rarely, and in this case was not, confirmed.

Laryngitis in Rams.—Abscess of the larynx was seen in stud Dorset Horn rams on a Molong property and stud South-down rams on a Wagga property. Affected animals are usually destroyed before asphyxiation occurs. From the abscess in one case *Corynebacterium pyogenes* was recovered. It appears that the organism is introduced by grass seeds penetrating the larynx. Hand-fed stud stock would be more exposed to this type of damage but why the disease has been confined to them is not understood.

Suspected Clostridial Toxaemia in Sheep.—Sudden deaths with lung involvement have occurred in most years in ram weaners on a Molong stud. Investigation revealed that a toxin was involved. Vaccination with pulpy kidney and blackleg vaccines is being tried, as the disease appears to be an aberrant clostridial toxaemia.

Neoplasms in Ewes.—On an Armidale property the incidence of cancer of the vulva increased following mulesing. The areas bared by the operation become affected with trefoil dermatitis and this may be a factor.

Lumpy Jaw in Sheep.—Swelling of the face of wethers occurred on an Armidale property and was found to be due to Actinobacillosis.

Swine Pox.—One case of swine pox was diagnosed in the Tweed-Lismore district during September, 1953. The condition was associated with lice infestation.

Tremor of Pigs.—A condition of trembling in young pigs was seen on four Grafton properties. The pigs on three properties were related. The fourth property appeared to have no connection. The condition was seen in Newcastle district where three out of ten suckers in one litter showed continuous trembling from birth. It is suspected of being due to an hereditary factor.

Poison Plants.—As usual, some mortalities were associated with poison plants. Heliotrope was again the cause of mortalities in the central west and southern districts.

Mineral Poisoning.—Arsenic caused a considerable number of losses, usually the result of carelessness in handling the material. Carbon tetrachloride poisonings were reported. Some cases in the Bathurst district appeared to be associated with grazing, prior to drenching, on plants containing oxalates. Chronic copper poisoning was associated with grazing on subterranean clover pastures.

NOTIFIABLE DISEASES—SUMMARY.

Disease.	Outbreaks	Animals Quarantined.	Deaths.	Districts.
Anthrax	13	19,518 sheep 1,927 cattle 193 pigs 4 horses 2 dogs	354 sheep 33 cattle	8
Fowl Cholera	...	...	...	...
Contagious Pneumonia of Swine ...	2	858	12	2
Necrotic Enteritis	3	452	53	3
John's Disease	...	...	...	...
Pyoplasmosis	5	396	8	1
P. P. C.	12	827	49	8
Swine Brucellosis	...	...	...	...
Swine Dysentery	...	...	...	...
Swine Erysipelas	2	72	3	2
Trichomoniasis	8	702	...	4

Animal Quarantine.

The numbers of domestic animals imported into New South Wales from overseas increased by comparison with the preceding twelve months, as illustrated by the following figures:—

	1952-53	1953-54
Dogs	150	194
Horses	247	555
Birds from New Zealand	171	400
Fish (consignments)	57	74

The number of cattle from overseas was 131. Of these eighteen were Brahmins from the United States of America. A total of 120 sheep was imported from New Zealand.

One Hereford cow which was landed into quarantine at the end of the year had apparently developed actinomycosis on the voyage out from Great Britain. As the cow is due to calve, arrangements have been made for her slaughter after calving.

A great variety of animal products was imported from overseas and came under the Animal Quarantine Service's control. The co-operation between Customs Department and this office has been excellent. Migrant vessels continued to arrive. Cheese, salami and other animal products were seized.

Parcels Post Office and the Overseas Air Terminals at Mascot and Rose Bay were visited frequently because of prohibited goods held by the Trade and Customs officers for quarantine inspection.

Hides and skins from overseas were examined prior to landing and if found to harbour insects were fumigated or sprayed prior to release. Some trochus shell imported from Pacific Islands was found to be infested with fly and was treated prior to the issue of a Permit to Land.

Several animals and birds found on overseas vessels which were not bonded and some bonded animals which were unwanted were seized and destroyed.

Several saddles imported by air were seized and destroyed as were some hams imported by air from New Zealand. Continued difficulty has been experienced in the case of hams from New Zealand. Apparently the New Zealand authorities

fail to warn consignors of hams that the importation by air is not permitted, although for years the airway companies and the Department of Agriculture in New Zealand have been reminded.

Two bonds have been estreated in the Port of Sydney as a result of the failure of masters of vessels to comply with the requirements of the bond.

A consignment of hog casings sent to Australia from the United States was returned together with the Health Certificate issued by the United States authorities: A salami seized at Mascot on 29th June, 1954, was being imported by Ocean Salads, of Glebe, New South Wales. This firm claims to have been importing salami by ship for some time, but no licence to import has been issued in Sydney.

Meat Inspection Service.

State Abattoir.—Veterinary supervision was maintained over routine meat inspection as well as the ante mortem inspection of all cattle slaughtered, which was carried out by a senior meat inspector. T.B. reactors, PPC in-contacts and various other suspect diseased cattle were subject to special post-mortem examination by a veterinary officer.

Attention was given to hygiene in all departments where meat is handled. At the Meat Market an inspector was on duty each day and night inspecting meat introduced into the Metropolitan Abattoir Area and all meat, except that for export, passing through the Market. A considerable quantity of meat was condemned at the Meat Market, mainly for putrefaction or bone taint. A close watch was maintained to ensure that vehicles used for the transport of meat were clean and suitably constructed. As a result of increasing demands on the inspection staff, particularly at country works, the number of inspectors available at Homebush Bay was less than the requirements on all but thirty-seven days, the deficiency being as high as fourteen on occasion.

Private Slaughter Houses in the Metropolitan Abattoir Area.—Owing to the unavailability of an experienced veterinary for this duty, supervision of these premises was difficult, but the senior meat inspectors in charge at Auburn and Riverstone ensured that routine meat inspection was carried out satisfactorily.

In the outer metropolitan area, licenses of the twelve existing slaughter houses were reviewed by the Metropolitan Meat Industry Board; ten were subject to major structural alterations, or complete re-building, and the provision of facilities for a more efficient meat inspection. All these slaughter houses were visited on several occasions by the Principal Veterinary Officer and veterinary officers. To implement the policy of full inspection, arrangements are in hand to increase the number of meat inspectors on this work, from four to six.

Knackery Inspection.—The inspection of horses slaughtered for animal consumption only was carried out at three knackeries in the metropolitan area. This is done on behalf of the Department of Public Health.

City Office.—A staff of eight meat inspectors, including one senior located in the city, carried out the re-inspection of meat introduced into the M.A.A., control of illegal introduction, the inspection of meat supplied to Government institutions and the inspection of retail butcher shops.

Flemington Saleyards.—The inspection of all cattle passing through Flemington saleyards was carried out by a senior meat inspector under the supervision of a veterinary officer. A total of 260,432 cattle was inspected and 2,686 suspects were marked.

Country Abattoirs.—The inspection of meat for introduction into the M.A.A. was carried out by the Service at fourteen abattoirs and bacon factories outside the M.A.A. Most of these premises killed more stock than during 1952-53 and additional inspectors were sometimes provided from Homebush Bay to assist in peak periods.

Lamb Branding.—The inspection of lamb for sale within the M.A.A. was carried out by the Meat Inspection Service at three abattoirs and arrangements are in hand for an inspector to be transferred to a fourth abattoir for this purpose. During the inspection of butcher shops a number of breaches of the lamb branding regulations were detected and ten butchers were prosecuted in this regard.

Butchers' Shop Inspection.—A total of 2,419 inspections were made by meat inspectors in the metropolitan area. In addition to the sale of unbranded lamb, shop inspections revealed cases of exposure for sale of other meats, not showing the "D.A." inspection stamp. Most of such meat was originally inspected for export only, and subsequently placed on the local market. A quantity of meat illegally introduced into the M.A.A. was seized at one butcher's shop.

Stock Killed and Inspected under the Meat Industry Act.

Place of Slaughter.	Type of Stock.				
	Cattle.	Calves.	Pigs.	Sheep.	Horses
State Abattoirs	191,590	107,169	112,863	2,687,152	...
Licensed Works within Metropolitan Area	91,269	9,642	6,543	942,004	...
Licensed Works in Country Areas	272,304	346,777	255,309	448,688	...
Knackeries	8	.....	.....	.....	8,564
Total	555,171	463,588	374,715	4,077,244	8,564

Condemnations made at Time of Slaughter at Homebush Abattoirs and Premises Licensed Under the Meat Industry Act.

Condition.	Total Condemnations.				Partial Condemnations.			
	Cattle.	Calves.	Swine.	Sheep.	Cattle.	Calves.	Swine.	Sheep.
Actinomycosis	4	...	...	...	6,107	...	...	...
Arthritis (includes Polyarthritides) ...	5	6	110	654	88	15	1,004	2,937
C.L.A.	...	...	...	1,616	...	...	...	9,036
Cysticercus ovis	...	...	...	16	...	...	...	...
Emaciation	1,297	64	101	9,621	...	...	...	...
Sarcosporidiosis	...	...	...	395	...	...	...	...
Septic conditions ...	513	112	2,603	640	161	14	453	507
Tuberculosis	4,841	82	2,387	...	3,603	8	6,284	...
Others	577	4,043	481	3,554	934	91	939	3,320
Total	7,237	4,307	5,682	16,496	10,893	128	8,644	15,800

Glenfield Veterinary Research Station.

GENERAL.

The work and activities of the Station continued to expand. The diagnostic work is each year increasing. The volume of inquiries from livestock producers is becoming a considerable time consuming factor. Pastoralists on visits to the city do not hesitate to come to Glenfield to discuss a problem or inspect current work. Many notable overseas scientists visited the Station during the year.

Field Days.—The two regular field days were held, one for members of the New South Wales Institute of Inspectors of Stock, and the other for the delegates to the Annual Conference of the Pastures Protection Boards, at which the attendance was the largest on record.

Asian Visitors.—A number of scientists from Asiatic countries and Africa spent varying periods working in the laboratories, under F.A.O. or Colombo Plan Fellowships.

VETERINARY DIAGNOSTIC SERVICES.

The volume of diagnostic material received in the Glenfield laboratory constituted a record, exceeding by 9 per cent. the record 1952-53 figures. Moreover Specimen Register entries exceeded 4,000 for the first time. The most significant rise was in sheep specimens. They were double those of 1952-53, and attributable largely to the toxæmia of pregnancy project and to trace element investigations.

The incidence of Leucosis substantially increased. Control remains a problem. Pullorum Disease, which had declined in recent years, increased from 164 in 1952-53 to 258 this year. Psittacosis, associated with cases in human beings conducting bird shops was again identified in parrots and finches. Many bird fanciers either remain ignorant or disregard the potential danger of this disease to themselves.

Specimens Examined.	1951-52	1952-53	1953-54
Sheep	958	716	1,456
Poultry	3,650	2,926	4,401
Pigs	1,487	1,110	1,307
Horses	82	110	107
Cattle	11,375	15,012	14,247
Miscellaneous animal and bird specimens...	261	179	239
Miscellaneous specimens	267	710	1,201
Totals	18,080	20,763	22,958
Fatrics in Specimen Register	3,502	3,974	4,192
Inspections under provisions of the Noxious Microbes Act	14	31	27

VETERINARY RESEARCH—CATTLE.

Artificial Insemination of Dairy Cattle.—The progress of the centre at Berry is encouraging. It was necessary to appoint a third field assistant, to cope with the demand. The number of herds receiving the service is now 201, and in seventy of them a bull is not now kept, whilst others retain a bull only because a service on Sundays could not be provided under the present staff establishment.

During the year 3,150 first inseminations were undertaken, compared with 1,060 to 30th June, 1953. This represents one-fifth of the registered cows within the area. A total of 31,800 miles has been covered to provide this service. The overall position in conception rates is very satisfactory, despite some variation between bulls. For all three breeds there has been 60 per cent. conception to first, 25 per cent. to second and 11 per cent. to the third insemination, assessed on a basis of ninety days non-return. This is very encouraging in an area where there are infertility factors operating in the female.

A 9 per cent. fall in the fertility of semen between the first and third day suggests that more frequent collections from more bulls are needed.

The imported Friesian bull "Moosheart Prince", from Canada in June, 1953, has proved a great disappointment. His semen has never been other than of poor quality for artificial insemination, giving a conception rate of 9 per cent. He was removed to Hawkesbury Agricultural College for natural mating and has been a complete failure there.

Trichomoniasis.—Specimens received for diagnosis provided additional evidence that bovine genital trichomoniasis is widespread. Doubt exists on whether adequate control measures are practicable. It is evident that field officers and practitioners are preoccupied with the view that every case of abortion in cows is due to trichomoniasis or possibly vibriosis and there is a decreasing awareness of the importance of brucellosis. Several cases of suspected trichomoniasis have been proved by laboratory examination to be brucellosis.

Heat inactivation of blood serum for use with glucose phosphate broth has increased the value of the mixture as a cultural medium for *T. foetus*. Thiol medium also has been useful, since by subcultivation at intervals of from three days to three weeks, *T. foetus* has been maintained on it for over twelve months. Some interesting facts on the effects of deep freezing on *T. foetus* have been obtained, with the assistance of the Department of Veterinary Physiology, University of Sydney. The inference of the research results is that glycerol protects *T. foetus* against the harmful effects of deep freezing as it does in the case of spermatozoa but it soon destroys the former in the unfrozen state.

This suggests the possibility of using trichomoniasis-positive or suspect bulls through artificial insemination where deep-freeze semen storage is employed. Such semen would have to be used immediately after being thawed, when trichomonads are still active; but it remains to be established whether they have retained their reproductive capacity or pathogenicity. To achieve a satisfactory conception rate with frozen semen it is necessary to "equilibrate" with glycerol for several hours before freezing is commenced. Any trichomonads present might succumb to the effects of glycerol during this pre-freezing period. The possibility of employing glycerol for a similar purpose when semen for A.I. is stored in the usual way would appear to depend largely upon whether or not the required concentration is harmful to the stored sperms.

Leptospirosis.—In co-operation with Dr. Forbes of the School of Tropical Health, University of Sydney, the serological survey of cattle and pigs in the State for leptospiral infection has continued. Over 1,000 cattle sera have now been examined for leptospiral agglutinins. The following findings are of interest:—

- (i) *L. grippotyphosa* antibodies have been demonstrated in sera from cattle in the south-eastern corner of the State. This leptospire has not been isolated in Australia but has been responsible for disease in both cattle and humans in Israel. An attempt is being made to isolate the organism to confirm its identity.
- (ii) A few cattle which have aborted and proved negative to *Brucella* and *Trichomonas*, have shown significant titres to *L. pomona* agglutinins. Although the organism has not yet been isolated, it seems highly likely that leptospiral abortion does occur in this State.
- (iii) Leptospirosis may be responsible for an acute febrile condition in cattle on a Gundagai property. Affected animals show a nasal and ocular discharge, rapid loss of condition, dermatitis about the nostrils, with 50 per cent. death rate within one week. The cause has not been ascertained but serum samples from two sick animals revealed *L. mitis* antibodies.

Of fourteen properties where there has been a history of abortion in sows or neonatal mortality, pigs from nine of the herds have reacted to *L. pomona* and two to *L. mitis*. Attempts to demonstrate leptospire in the urine of reacting sows has not yet proved successful. In a piggery where an

employee has been affected with leptospirosis, serological examination of a random sample of the pigs revealed fifteen out of twenty-two to be positive to *L. pomona*.

In view of recent American work demonstrating the association of leptospirosis agglutinins with cases of periodic ophthalmia in horses, an opportunity to examine sera from six affected horses was taken. All gave positive titres of *L. pomona*.

Milk Fever Complex.—Ultra filtration of serum through a semi-permeable membrane has been carried out dividing the total calcium into diffusible and non-diffusible fractions. The latter, for the most part, is bound to serum protein. In field cases of milk fever the protein-bound component, contrary to expectations, tended to decrease, with a resultant increase in the proportion of diffusible calcium. Progress has been made with a colorimetric technique for the determination of the ionised fraction of the diffusible fraction.

Overseas reports suggest that Dihydroalachysterol (A.T.10) has the power to raise serum calcium following injection of cows. This property would be of great value as a preventative of milk fever. Experiments in lactating and non-lactating cows with subcutaneous and intravenous injections have failed to show the features of a calcinosis factor. Further work will be undertaken on cows near parturition.

Mineral Deficiencies in Cattle.—Copper deficiency has been found in cattle on a number of north coast properties. From numerous analyses of pastures from affected properties it is clear that some form of secondary hypocuprosis is involved. In at least one of the affected herds spectacular responses to copper therapy have been observed. A concurrent phosphorus deficiency has been found in some of these herds.

Rugging Experiments with Dairy Cattle.—Two more rugging experiments were conducted in co-operation with the staffs at Wagga Agricultural College and Experiment Farm and New England Experiment Farm, Glen Innes. In neither trial was any marked difference observed in milk production and health of rugged and unrugged cows. From the results of these two trials and one in the previous year it has been concluded that leaving well-fed cows unrugged during the winter in most parts of this State would have little effect upon their production and health.

VETERINARY RESEARCH—SHEEP.

Mycotic Dermatitis.—Investigations continued on the efficacy of various compounds incorporated in dip preparations for control of mycotic dermatitis of sheep. In February, 1954, a trial was commenced on a Riverina property where mycotic dermatitis has been a problem. An infected flock was divided into four groups and the incidence of the infection plotted in each animal.

The first group was treated with Sulphadip and Rusept, the second with 0.05 per cent. equal proportion mixture of sodium o-phenyl phenol and sodium dihydroxydichlorodiphenyl methane, the third group with 0.125 per cent. suspension of T.62 methane (bis. 3, 5, 6-trichloro-2-hydroxyphenyl methane) and the fourth group untreated controls. Observations were still in progress at 30th June, 1954.

Foot Rot in Sheep.—In August, 1953, the Division of Animal Health and Production of the C.S.I.R.O. organised a seminar on foot rot in sheep, at Young, attended by Departmental veterinary officers from all States. It was an excellent opportunity for discussion and to observe results of experimental treatments with Chloromycetin in methylated spirits on some affected flocks in the Young district.

Four field trials using Chloromycetin, including formalin and copper sulphate as comparative treatments, were subsequently organised in New South Wales. These trials substantiated that unless the feet are pared, foot rot, an infectious disease, cannot be even satisfactorily controlled, least of all eradicated which should be the aim. Chloromycetin, applied with a brush to affected feet, was effective in from 87 per cent. to 92 per cent. of affected feet. Treatment through a foot bath in 5 per cent. to 10 per cent. formalin has given up to 100 per cent. cures. The provision of pastures, spelled for at least two weeks, for sheep following treatment is essential for eradication.

Chloromycetin is a useful treatment tool but the cost of 1s. per foot inhibits its general adoption by the industry when compared with the cost of foot bath formalin treatment.

Ovine Brucellosis.

Epididymitis in Rams.—In recent years research in New Zealand and Queensland has revealed epididymitis in rams associated with an organism resembling but not identical with the genus *Brucella*. The condition causes sterility in affected rams and is significant in flock fertility. Breeders in South Australia and Victoria have reported the condition and sought advice on control.

A survey amongst studs of British breeds in South Australia, reveals that the condition exists widely. Early in December, 1953, in consequence of representations to the C.S.I.R.O. a conference was convened in Adelaide attended by representatives of all States except Western Australia and Tasmania. It was largely fact finding, to define the disease and indicate the lines for future investigations.

Although New South Wales carries approximately half the sheep population of the Commonwealth, New South Wales breeders have never reported epididymitis in rams. In February, 1954, the owner of a well-known Merino stud approached the Director of Veterinary Research for an examination of his rams. The clinical examination of over 600 non-mated young rams revealed several cases of epididymitis. These rams are now at the Glenfield Research Station, forming the bases of studies on the causative organism, the pathology of the disease and its method of transmission.

Toxaemia of Pregnancy.—The pathogenesis of pregnancy toxaemia in ewes is being studied. It includes comprehensive biochemical and pathological observations on the cerebral depression of insulin induced hypoglycaemia and of field cases of pregnancy toxaemia. The symptoms have been correlated with the blood glucose levels. The neurophysiological basis of the symptoms was studied and observations made on the *in-vivo* metabolism of affected sheep. The depth of hypoglycaemia is significant to the survival of the affected animal.

It seems that by the use of insulin the syndrome of pregnancy toxaemia can be reproduced, permitting laboratory study and overcoming the dependence on field cases. This has enabled encephalopathy studies to be undertaken concurrently with the biochemical observations. The electroencephalography of normal insulinised sheep and cases of pregnancy toxaemia have been established. Normals and departures from normals have been recorded in sheep with irreversible brain damage caused by insulin and pregnancy toxaemia.

The effect of exercise on the hypoglycaemia fasted pregnant ewe produced a marked hyperglycaemia which lasted for at least four hours. At present this seems the logical line of treatment to prevent cases of the disease. Potassium, sodium and chloride levels in the brain are also being studied. The investigations are at an interesting stage and the grant provided from Wool Research Funds for this project is appreciated.

Chronic Copper Poisoning and Heliotrope Poisoning.—Only five outbreaks of heliotrope poisoning were confirmed by laboratory examination in 1953-54. These occurred in the Dubbo, Deniliquin, Forbes and Bathurst districts. The last mentioned occurred in sheep which came from Forbes only a few months previously. Only light losses occurred in all investigated outbreaks except one in the Forbes district where 250 sheep had died over a period of sixteen months. The confirmed cases do not indicate the extent of losses however. Many outbreaks are not reported to field officers, while in other outbreaks suitable material is not available for laboratory examination.

Five confirmed outbreaks of chronic copper poisoning in sheep occurred, in the Gundagai, Young, Carcoar, Molong and Urana districts. Three occurred in subterranean clover pastures. A fourth followed grazing on skeleton weed. The latter outbreak is of interest as skeleton weed is frequently present on affected properties and had previously been suspected of containing some hepatotoxic principle. Laboratory examination confirmed copper poisoning as the cause of the mortality but the general pathology differed from that seen on subterranean clover pastures.

Previous examination of more mature samples of skeleton weed from other affected areas had not revealed the presence of alkaloids, but the opportunity occurred on this property to collect the plant in the rosette stage on which the sheep had grazed, and analysis of the plant for any toxic principle is awaited with interest.

Conditions favourable for copper poisoning on subclover pastures in the enzootic area of the southern tablelands did not occur. No outbreak was reported. Similarly conditions did not favour the experimental work at Tumbarumba where molybdenum topdressing and sulphate lick trials are being carried out.

Following the demonstration of alkaloids, similar to those found in heliotrope, in Patersons Curse in areas where jaundice losses occurred, bulk samples of this weed were collected so that the alkaloids present may be isolated and examined in regard to their structure and toxicity.

VETERINARY RESEARCH—POULTRY.

Hermitiasis of Turkeys.—In 1952-53 this disease in turkeys was first recorded in New South Wales. Two further outbreaks have been encountered, the first in the near-metropolitan area and the second at Tamworth. The mortality rate in poults from three to five weeks of age was exceedingly high. Studies show that the majority of recovered birds carry the protozoan in their intestinal tract for two months, but some are carriers

for as long as seven months. In the two outbreaks investigated this year, the poults were on wire but the fly population was very high, and flies may be spreaders of the infection through contamination of feed and drinking water.

Antibiotics have been explored as a means of control and very promising results have been obtained with aureomycin, as a capsule *per os* or fed in the mash. Penicillin *per os* was also fairly effective, but less spectacular in its effects than aureomycin.

Infectious Laryngo Tracheitis.—It was hoped to organise three field trials in the spring of 1953 to compare the egg-grown I.L.T. prepared by Commonwealth Serum Laboratories with the so-called tracheal vaccine used commercially in this State. The disadvantages of the tracheal vaccine have been mentioned in former reports, and under laboratory conditions the egg-grown vaccine of C.S.L. has proved to be a very satisfactory antigen.

However, it was possible to undertake only one field trial, on a Quakers Hill property which has always experienced I.L.T. in the early spring. In this spring laryngo tracheitis did not occur either in the vaccinated or non-vaccinated birds. The trial served one useful purpose, demonstrating that the egg-grown vaccine produces a more consistent and definite local reaction than the tracheal product, which means that the egg-grown vaccine establishes a more satisfactory degree of immunity.

Avian Tuberculosis.—At the Wagga Agricultural College and Experiment Station observations continued on the efficacy of methods employed to eradicate avian tubercle from semi-intensive houses. The ground had been ploughed, a fodder crop was grown, and the area was unstocked for two years, then restocked with pullets. The stock in the treated pens has been regularly tested, and in nearly two years there has been no evidence of infection in the birds.

Miscellaneous Projects at Glenfield V.R.S.

Rabbit Myxomatosis.—In co-operation with the Genetics Section of the C.S.I.R.O., investigations continued on the inheritance of immunity to the disease from parents to progeny. The degree of resistance in the progeny of immune parents is very slight, but to what extent mutations of the virus in the field may affect the lethal performance of the disease cannot yet be assessed. The experience of the 1953-54 summer proved encouraging. Over the spring and early summer some districts, notably the tablelands, had increased rabbit populations, and although laboratory virus from the Glenfield Station was used extensively the disease did not develop in epizootic proportions. This can be attributed to the almost total absence last spring and summer of blood-sucking vectors because of the extremely dry conditions which prevailed until late January, when copious rains occurred especially in the Riverina. Within ten days of the rain, myxomatosis appeared in epizootic proportions along the Murrumbidgee River. The pattern of its performance over subsequent months closely followed that of the summer of 1950-51 when it was first released on the Murray. Even as late as mid-June the disease was still very active on the Upper Clarence, with sand flies the predominant vector. There are still a few foci in the State, notably Dubbo and Trangie, where high grade kills have not occurred.

Stock owners' demand for the virus continued: 296,900 doses of the virus were supplied. Of these, 262,950 went to Pastures Protection Boards and 20,050 direct to graziers. Some 279,200 doses were supplied in 1952-53.

It is clear that myxomatosis in New South Wales has reduced the rabbit population at the present time to an all time low.

Tuberculosis Survey in Humans—Typing of Strains.—At the request of the Tuberculosis Division of the Department of Public Health the typing of strains of *M. tuberculosis* recovered from man in New South Wales has been undertaken at Glenfield. Dr. Seddon took up duty as bacteriologist in July, 1953. During the year, 1,064 cultures of *M. tuberculosis* and one sputum sample were received from bacteriologists in Public Hospitals throughout the State. Most of the strains were pulmonary cases, which constitute the majority of the cases in Australia. Not enough of the strains were from non-pulmonary cases and from children. Only one culture has shown the characteristics of the bovine type. It is apparently from an intestinal infection in a child.

Additional cultures will be received from country hospitals, notably Broken Hill, Tamworth, Wollongong, Cessnock and Lismore, for typing. These are areas in which bovine infection might be expected. At least another 1,000 cultures should be typed before the position is clear. The project is important, providing information on the critical factors which determine the identity and pathogenicity of human from bovine tubercle. This has been a contentious subject amongst bacteriologists for years.

Semi-Synthetic Sow's Milk.—Five trials using sixty pigs have now been conducted to develop a cheap substitute for sow's milk and a satisfactory method of rearing newborn pigs without the sow. Moderate success has attended the use of a simple milk formula containing skim milk powder, dripping lecithin, vitamins A and D, iron, copper and aureomycin. Feeding the milk as a dry powder was shown to be satisfactory, while in the most recent trial no advantage was gained by adding a complex vitamin mixture to the synthetic milk. Average weaning weights approximated those of sow-reared pigs. It has not yet been possible to wean pigs at above average weaning weights.

Studies on Parathyroid Function.—Sodium oxalate was injected into sheep and resultant blood calcium changes were studied with a view to using this technique as a parathyroid function test. An optimum dose rate was found. Serum calcium was recovered for the most part within sixty minutes. The depression was mainly in the non-diffusible fraction of the serum calcium.

Preliminary investigations have been made into the anatomy and histology of bovine parathyroid glands. In the ox, these are divided into internal and external glands and their location and recognition in the animal are extremely difficult. With further progress it is hoped that parathyroidectomy may be performed in both cattle and sheep, and subsequent phenomena studied.

Aphid Pigments.—Black bean aphids (*A. eraccivora*) collected from the field in outbreaks of sheep photosensitivity have been examined for fluorescent pigments. One pigment, erythroaphin-or, has been isolated and its photodynamic properties demonstrated. It belongs to the same group of pigments isolated from other species of aphids by English workers. The similarity of erythroaphin to hypericin, the active principle of St. Johns Wort, plus the frequent association of aphid infestation with photosensitivity, indicate that this fluorescent pigment is probably responsible for some outbreaks of photosensitivity. Attempts will be made to detect the pigment in the tissues and body fluids of animals in the early stages of the syndrome.

Protein Content of Mill Offals.—To obtain sound data on the protein content of New South Wales mill offals, samples of grain and their offals from all parts of the State are being examined.

Nutrition Research from Glenfield Laboratory.

Copper Deficiency in Sheep.—The interrelations of copper, molybdenum and sulphate concentration in feed, and the effect of plane nutrition on the copper status of sheep are under investigation. Hypocupraemia and liver coppers of 30 ppm and banding of wool in black sheep have been induced by

feeding a ration containing about 6 ppm copper, 6 ppm molybdenum and 0.5 per cent. sulphate. Sheep on the same diet but receiving only half rations were similarly affected but blood copper levels declined more slowly. Other treatments in the experiment indicate that even on a low molybdenum level, about 1 ppm, a high sulphate level, about 0.5 per cent., in the feed, can cause considerable loss of liver copper. On the other hand, high molybdenum (6 ppm) and low sulphate (0.1 per cent.) intakes have produced no significant changes in the liver copper when compared with the control group.

Sodium Chloride and Potassium Metabolism in Sheep.—Sodium and potassium determinations in serum using the Beckman Flame photometer are now being carried out as part of several projects. Methods for sodium and potassium estimations in pastures and feeds have also been developed and applied to a considerable number of specimens throughout the State. This is part of a survey to detect suboptimal sodium contents in pastures. Chloride estimations are being carried out at the same time.

A fundamental study of sodium, chlorine and potassium metabolism of sheep has been initiated.

Drought Feeding Research in Sheep.—This work is being carried out by the Burdekin Drought Feeding Research Unit in co-operation with the C.S.I.R.O. The effects of maintaining sheep on 4, 3 and 2 lb. of starch equivalent per week has been investigated. After about four months each group stabilised in weight and condition at different bodyweights, with appreciable losses only in the group on 2 lb. of starch equivalent per week. This work is now being analysed.

The effect of feeding a complex high protein as a supplement to low protein roughage has been studied. Daily and bi-weekly feeding of the supplement were equally effective. Weekly feeding was inferior. The results are now being applied in a large scale experiment involving twenty-two groups of sheep.

Early weaning of lambs reared under drought conditions has been studied. Weaning at six weeks at about 16 lb. bodyweight has been found quite practicable.

Supplementing with sodium chloride a drought level diet of 100 per cent. oats, a very low sodium diet, gave no response in a long term experiment. This confirmed previous work.

Effect of Plane of Nutrition on Adult Performance.—A long-term study of the effect of early nutrition on adult performance, in particular as regards reproduction, wool growth, teeth, and senility, is in progress.



The hogget is receiving a Vitamin D injection, in a Temora Experiment Farm trial. In southern latitudes sheep may respond to Vitamin D supplement when grazing oats over winter, but there is no response in the Temora trial.

Poultry Nutrition Research.

Simplified Diets for Chickens.—Further work on simplified and high energy rations for chickens has been carried out. Papers are at present being prepared for publication. Broom millet seed has been compared with wheat in chicken diets. It caused somewhat slower growth, probably due to lower energy content, but the normal health and appearance of the birds indicated that this seed may be used in such rations.

Methionine Supplements for Chickens.—A study of methionine supplements to chicken diets has given encouraging results. Further work is proceeding.

Synthetic Riboflavin Supplement for Hens.—Comparison of the growth rates and viability of chickens from hens whose diets were supplemented with synthetic riboflavin, a mixture of B complex vitamins or feeds naturally rich in the B complex, confirmed that riboflavin, as a sole supplement to simple wheat—meal diets, assures maximum hatchability but may depress the growth rate and viability of the chickens.

A report on this work has been prepared for publication.

Vitamin A Supplements for Laying Hens.—Comparison of the effect of substituting vitamin A supplements for green feed has shown that some factor other than vitamin A is supplied by green feed or whey, and is necessary for maximum egg production on wheat-mill-off-meatmeal diets. The identity of this factor is being investigated.

Shannon Vale Nutrition Station.

Observations proceeded on the progressive effect of Merino flocks grazed full time on sown pastures as compared with a similar flock half time on sown pastures, the differential treatment being continued through the summer months. Initially wethers had to be included in both groups to bring them up to the required numbers. With ewe weaners available from the females in each group it has been possible to eliminate the wethers. The data is being considered exclusively from the ewe aspect, except in respect to recording the sex ratio of each year's lambs.

The extremely dry period which prevailed from August, 1953, to February, 1954, was the most severe drought period experienced since experiments commenced at Shannon Vale. At the end of January, 1954, the pastures had so deteriorated that supplementation may soon have been essential but for the February rain completely altering the grazing position. Data are not yet sufficient to estimate the economics of return per acre of the respective flocks.

The abnormal, dry season prevented significant results from the rate of superphosphate trial, in which the fertiliser was applied at rates of 1, 2 and 3 cwt. per acre. In spite of the low rainfall during the last six months of 1953, it was possible, without overgrazing, to stock the sown areas at the rate of ten sheep to the acre for seven weeks in the spring.

Mating the Romneys in the July-August period was repeated and once again the lambing percentage has been very low. Apparently this period is too late for a good concentration rate, the oestral cycle being in the stage of winter dormancy. The use of E.C.P. (Estradiolcyclopentylpropionate) was quite valueless; the ewes come into season but this is not associated with ovulation, and consequently there is failure to conceive. In addition, the regularity of subsequent oestrus is disturbed and lambing percentages are curtailed.

Trangie Agricultural Experiment Station and Wool Laboratory.

The resignation of the Officer-in-Charge of the Laboratory, an animal geneticist with collateral training in veterinary science, has been a blow to the progress of the sheep genetics work at Trangie.

Breeding Experiments.—Observations continued on the two merino flocks in this project. In the "Index Flock" selection is being based mainly on freedom from skin folds and maximum fleece production. Half of the "Random Flock" lamb in the spring and half in the autumn, and selection is random. The third flock, the Merino stud, serves as a control. It is run as a commercial stud, high class rams being imported from other studs as considered necessary.

The selections this year have been for and against fleece weight, for and against crimps per inch, for and against fold score, for and against weaner weight, and the following factors have been measured: greasy fleece weight, clean fleece weight, staple length, crimps per inch, fold score and body weight.

Clear differences are appearing in the selection groups, with the exception of weaning weight, and substantiate earlier data on inheritance of these characters. Data from the stud flock are of particular interest in that their clean fleece weight is lower than the index flock, they are more folded, and have a shorter staple. Estimates of heritability and the effects of inbreeding have continued, the later showing that increased inbreeding is accompanied by decreased viability.

Milk Yield of Merino Ewes.—A study of the milk yield of Merino ewes was completed. The observations were made on seventeen ewes. Maximum production is attained during the first three weeks, whilst the live weight of the lamb at 9 weeks of age is a good indication of the milk yield of the dam. The correlation between a one-day test and an average test for nine weeks was 0.93. The merino ewe may yield up to 39 ounces per day.

Fertility studies.—In a pilot experiment on the effect of Benzene hexachloride on ram fertility, rams were jetted on the back, poll and breech, and semen examinations were made for six weeks. Three of the four treated rams showed extreme seminal degeneration by the sixth week. A more comprehensive confirmatory experiment commenced in June.

Sheep, Early Nutrition.—A long-range study of the effect of early nutrition on subsequent growth, body size, wool yield, and fertility of ewes, and to ascertain whether genetic environment interactions are important was commenced.

Genetic Improvement of Australian Merino Sheep.—As a result of the findings on heritabilities of various characters, recommendations applicable to commercial establishments have been prepared. The emphasis is on mass selection for clean-fleece-weight combined with ordinary classing and should result in about 100 per cent. increase in the rate of improvement.

Co-operative Grazing Experiment.—This experiment, in co-operation with C.S.I.R.O., was commenced in 1948. The results are out of proportion to the efforts expended. A full report will be furnished by the Technical Committee.

Poultry Experiment Station, Seven Hills.

Breeding Improvement Plan.—The first results of the Reciprocal Crosses of inbred families of australorps and white leghorns have been analysed and published. The development of the inbred lines, two of the white leghorn families being of American origin, has taken some time, but in 1952/53 reciprocal crossing of whites and blacks was undertaken.

The birds were accommodated in large intensive houses and tested until 500 days old. The data recorded were on early mortality, eleven weeks body weight, age at first egg, adult mortality, broodiness, egg weight, adult body weight and egg production. The cross between the australorp male and white leghorn female had a lower mortality, was later maturing, showed more broodiness, was heavier at eleven weeks and 500 days and had about the same egg weight. In crosses between white males and black females the survivors' egg production was higher, and they produced more eggs than the reciprocal cross when housed in large units. When large units are to be used this cross is recommended.

Veterinary Research Publications.

The number of papers submitted for publication, from original work by research officers, reached an all time high. In all, twenty-eight papers were submitted to Editors and thirteen appeared in print before 30th June. In addition four articles of a semi-popular nature and extension value were published. Five new or revised extension pamphlets and brochures were prepared. The publications total for the year was thirty-seven.

Board of Tick Control.

Amongst the more important happenings were:—

The announcement of a Tick Eradication Programme.
The detection of cattle tick at Cheviot in "clean" country.
Arsenic resistant tick developments.

The escape of cattle from Quarantine Areas to "clean" country.

The occurrence of tick fever in three areas.

- (a) Cobaki.
- (b) Duroby Creek.
- (c) Wilson's Creek.

The Announcement of a Tick Eradication Programme.—This most important decision was announced in May, 1954, by the Minister for Agriculture. It applies to the Kyogle Quarantine Area and Quarantine Areas West of the Richmond Range, and will commence in January, 1956. The decision was well received by the majority of stockowners in the areas that will undergo the eradication campaign.

The dipping programme will comprise fortnightly dippings for fifteen months. It would appear at present that D.D.T. and B.H.C. will be the tickicides used. The dipping programme will be followed by the examination of stock at three-weekly intervals for a further twelve months. Stockowners have over eighteen months' notice of the proposed eradication and it will be possible for them to complete their boundary fencing and arrange their breeding programme to be in a position to proceed with eradication in January, 1956.

The Board of Tick Control is planning considerable preparatory work, to be completed prior to January, 1956. With the introduction of hydro-carbon dip materials it will be necessary to gravel 400 dip yards. Considerable unmusterable country must be leased. Approximately 50 miles of new fencing requires erection.

In addition, action has been initiated in respect to the extra staff that will be needed in January, 1956, and early appointment of another senior inspector, an assistant analyst, and a veterinary officer.

Cattle Tick at Cheviot, in "Clean" Country.—During examination of cattle at Cheviot Hills Station to enter the Emu Creek Quarantine Area, a single adult tick was found on the 22nd April, 1954. This detection west of the Tick Quarantine Areas was of considerable significance. The presence of cattle tick in "clean" country has long been suspected but this was the first confirmation.

Action was taken to declare the Cheviot Quarantine Area, involving some 120,000 acres. The new boundary is approximately 44 miles. Appropriate action has been taken to inspect cattle within the new Quarantine Area and to erect a stock-proof, quarantine boundary fence.

Arsenic Resistant Ticks.—Although tick infestations were detected this year in the Grady's Creek-Lynche's Creek Area, the infestations were light except in one case, and all responded readily to the four infestation treatments. The charging of D.D.T. and B.H.C. dips to deal with the arsenic resistant tick problem in this area therefore appears to have been quite successful. Despite adverse seasonal conditions policy treatments were continued until the February flood. In parts of the Tweed Quarantine Area arsenical dippings at fortnightly intervals did not clean up infestations. The areas concerned, widely divergent, were the Wardrop Valley, Highfields, and Dry Dock. Up to thirteen treatments in arsenic were given and still ticks were present on the cattle. Mature adult ticks were collected and taken to the Animal Health Station, Yeerongpilly, Queensland, where tests confirmed that an arsenic resistant strain was present.

It is desired to record appreciation of the co-operation by the Department of Agriculture and Stock, Queensland, in determining the arsenic resistant status of ticks in the Tweed herds.

With the exception of one herd, D.D.T. speedily brought the infestations under control; in the exception four dippings were required to clean the cattle.

There is now field evidence of arsenic resistance in herds in the Commissioners Creek, Reserve Creek and Tumbulgum Creek areas. The sections are being closely watched.

Escape of Cattle to "Clean" Country.—In July, 1953, two head of cattle broke out across the Southern Richmond Quarantine boundary. Two holdings involved in the break-through were leased. The area, now known as the Dewey Quarantine Area, will be kept free of stock for fifteen months.

Some cattle on the Southern Rivertree Quarantine Area broke into a portion of the Cheviot Station during the drought. It was not economic or advisable to empty the new area of stock but a new Quarantine Area was proclaimed. By examining stock from "clean" country going into Emu Creek Quarantine Area the infestation was found on cattle from Cheviot Hills Station. Had the Emu Creek Quarantine Area been emptied of stock, and leased, the Cheviot infestation may have been missed. Emu Creek Quarantine Area has now been absorbed into the new Cheviot Quarantine Area.

Following the cyclonic disturbances in February, 1954, cattle escaped from North-west Rivertree Quarantine Area onto "clean" properties for a few days and it was necessary to create the Bookookoorara Quarantine Area, involving five holdings with a stock population of just under 2,000. The Quarantine Area consists of approximately 30,000 acres. The country concerned is very rough and has occasioned a lot of work to make the boundary fence stock proof.

Tick Fever Outbreaks.—An outbreak of tick fever occurred in the Cobaki area on a property adjoining a tick fever holding. Only one animal died. Only one animal was affected with tick fever in a Duroby Creek outbreak but this case was of interest because it is three valleys removed from the closest incidence of tick fever, and the source of infection has not been traced.

In January a Queensland bull, infested with ticks, was illegally introduced from near Brisbane into Wilson's Creek-Mullumbimby area. It escaped detection at the Tweed Heads Border Gate. The bull was treated and returned within five days to Queensland but it was obvious that many mature adult female ticks had dropped off onto the pastures. A blood sample showed the bull to be a carrier of *Babesia bigemina*. Approximately seven weeks later a severe outbreak of tick fever occurred in the remaining cattle on the property. Four head were affected with the disease overnight. The owner elected to dispose of the rest of his herd for slaughter at Byron Bay Meat Works and to spell his property for fifteen months to starve out the larval ticks. Since the ticks introduced might be arsenic resistant the Wilson's Creek Dip was charged with D.D.T. This was in operation early in February but did not prevent the tick fever outbreak five weeks later. Cattle from the two properties adjoining the outbreak holding have been dipped at fortnightly intervals in D.D.T. and special precautions have been taken in regard to cattle moving through the Wilson's Creek Quarantine Area,

Kyogle Quarantine Line, Eight B.H.C. Cleansing Dips.—To protect other Quarantine Areas from the inroad of arsenic resistant ticks from the Kyogle Areas, all stock passing out of the area receive treatments in B.H.C. The Kyogle Quarantine Line was fitted with gates at the outgoing points. The line is patrolled. Restaffing of the line involved the employment of four patrol officers, and twelve gatekeepers; and eight dips, including the Kyogle Calf Dip, were charged with B.H.C.

Calf Dips at Murwillumbah and Kyogle.—The first calf dip in the Quarantine Areas was constructed at Murwillumbah and proved very successful. The hand spraying of calves was ineffective, and was a health danger to the operators. The calf dip was charged with arsenic. A calf dip was also constructed at Kyogle, but charged with B.H.C. to deal with the arsenic resistant tick problem in that area. It is proposed to construct calf dips at all important calf saleyards and the meat works.

A close check on calves through Casino Abattoirs has shown that dipped calves are practically free of ticks, whereas sprayed calves have a lot of scrub ticks.

Flood Damage.—In February the Tick Quarantine Areas were subjected to the most severe flood on record. The flood waters, torrential rain, and cyclonic conditions caused havoc. The enormous damage to the Quarantine boundary fences was repaired by the staff working long hours and, apart from the Bookookoorara, there was no breakthrough of cattle from the Quarantine areas into "clean" country. This was a fine achievement as any breakthrough, from the Southern boundary especially, may have serious consequences.

Dip yards and baths suffered severely. Many solution tanks were washed away and the losses of piping and corrugated iron were heavy.

The Tick Board of Control discussed these losses with the Flood Damage Committee, in session at Lismore, and an appropriation of over £16,000 was made by the Treasury towards the cost of flood damages to the Tick Quarantine Areas.

Interruption of Policy Treatments.—The seasonal conditions for the twelve months under review were extreme, from drought to flood. It was not possible, therefore, to implement the full policy of the Board. In areas east of the Richmond Range dippings did not commence until November, a month late and thereafter the policy in certain areas followed a varied course. Genuine cases of weakness and poverty in cattle had to be considered, and examinations instituted to replace dippings. However, after the February cyclone, and the restoration of dips after the flood, the policy treatments went on unhindered east of the range. Bangalow Sub-section of the Richmond Quarantine Area was better treated by seasonal conditions and in that area the full policy was implemented. The Tweed did not suffer so severely as other coastal areas and from November it was possible to carry out more treatment there.

The Quarantine Areas west of the Richmond Range were drought stricken until February, so policy treatments could not be commenced in those areas. With the flood and cyclonic damage and the necessity to repair the Tick Quarantine boundary fences, the usual monthly treatments were not invoked, but cattle were treated for movement.

Tick Employees, Valuers Under the Cattle Compensation Act.—Approximately twenty members of the tick staff east of the Range acted as approved valuers of cattle, under the Cattle Compensation Act. In areas west of the Range, the tick staff co-operated in dealing with suspects and in their valuation. The services of an arbitrator were enlisted where tick staff and the owner could not agree on values.

Fencing.—The condition of Quarantine boundary fences has been markedly strengthened, particularly the external boundary of Southern Rivertree Quarantine Area where 31½ miles of new four-wire barbed wire fence and 8 miles of renewal were erected. The fencing is continuing, and expected to be completed by 31st October, 1954.

Summarising the fencing progress, there have been:—

Fifty and three-quarter miles of complete new fencing erected, 30½ miles of repairs and renewal to existing fences, and 8 miles of wire strung in posts previously erected. In addition, 22 miles of the external boundary fences of Bookookoorara Area are now in stockproof condition.

Dip Reconstruction and Repairs.—Fourteen new Dip Yards were erected in the Tweed Area, and following the detection of cattle tick in the Cheviot Area the Sandy Hills Dip was reconditioned. Four dips are being constructed in the Tweed Area. Two calf dips, Murwillumbah and Kyogle, were built. In the Kyogle Area, prior to charging eleven dips with hydro carbons, it was necessary to gravel yards, etc. Numerous repairs to various dips in all sections of the Quarantine Areas were necessary after the February flood.

Prior to commencing in 1956 the eradication campaign in Kyogle and other areas west of the Richmond Range, approximately 400 dips will have to be charged with hydro carbons, requiring prior gravelling of the dip yards.

*Analyst's Report.**Statistical.*

Arsenical Concentrate manufactured, gals.	10,852½
Arsenical Concentrate Distributed, gals.	12,090
Arsenical Dips analysed	12,100
Samples of Arsenical Concentrate for manufacturing purposes	105
D.D.T. Dips analysed	155
B.H.C. Dips analysed	82
Water Samples analysed in connection with D.D.T. Dips	113
Cattle dipped in Arsenical Dips	1,960,000
Cattle dipped in D.D.T. Dips	88,535
Cattle dipped in B.H.C. Dips	49,510

Toxicology of Arsenic.—The determination of what constitutes a toxic dose of arsenic and the amount cattle can carry without showing ill effects is proceeding. Specimens collected from cattle slaughtered from one to ten days after dipping are subject of the analyses. The work so far indicates that the acceptance of 0.5 milligrams of As_2O_3 per kilogram as a toxic level is wide of the mark. The work is expected to be complete early in 1954-55, when more satisfactory toxicity standards will be laid down.

Settling Rates of Hydro Carbon Dips.—To determine the lapse of time that may be permitted between mobs of cattle going through B.H.C. and D.D.T. dips, both types have been analysed at various intervals after cattle have moved through. The work needs elaboration and repetition but has indicated that D.D.T. settles much faster than B.H.C. and that it is unwise to allow more than five minutes between mobs of cattle passing through the dip. With B.H.C. the period is closer to ten to fifteen minutes. These observations are very important to enable precautions to ensure that hydro carbon dips are at appropriate strengths when the cattle are dipped.

Manual Stirring of Hydro Carbon Dips.—Trials were conducted to determine the effect of manual stirring, for different periods, in building up the concentration of D.D.T. and B.H.C. dips. Analyses were taken at 10, 20 and 30 minute intervals. It was found that by conscientious stirring for thirty minutes both D.D.T. and B.H.C. dips could be brought up to the strength sufficient to kill ticks.

Effect of Scooping, on Hydro Carbon Dips.—It has been accepted that scooping of hydro carbon dips, especially D.D.T. dips, appreciably reduces the concentration. However, when analyses were made of a Grady's Creek D.D.T. dip before and after a necessary scooping it was found that the D.D.T. lost was not significant.

D.D.T. in Milk From Dipped Cattle.—Due to the possibility of a health hazard when milk is taken from a herd frequently dipped in D.D.T., milk samples from herds dipped fortnightly in D.D.T. were analysed. This work will be repeated, but the results so far do not indicate any likelihood of a D.D.T. concentration toxic for humans. Analyses will also be made of the cream, since D.D.T. tends to concentrate in fatty materials.

Analytical Techniques.—Progress in the analysis of chlorinated hydro carbons has been such that we are now able to determine both gamma isomers and para isomers in B.H.C. and D.D.T. respectively, the former by a chromatographic column and the latter by selective crystallization.

A project has been commenced in collaboration with the Chemist's Branch of the Division of Science Services, to investigate the gamma isomers of B.H.C. in dipping fluids.

Microdetermination of Arsenic.—The method for microdetermination of arsenic has reached the utmost point of efficiency, employing the accepted principles. Unless new principles are introduced, dispensing with either wet or dry combustion of organic matter, each of which requires prolonged oxidising treatment, the time for analysis cannot be further shortened. Attempts at direct precipitation or distillation of the arsenic from the organic matter have only been partially successful.

Queensland Border Control.

Western Division.—Because of dry conditions sheep and cattle dealing declined. Consequently less than half the normal number of stock crossed to this State from Queensland. However, Queensland markets were good and large numbers of sheep moved to that State.

It has been difficult to make agents, owners and drovers conscious that a Health Certificate (Form 181) is required for the entry of stock to Queensland. It is possible, because of staff shortages, that mobs have crossed without this form.

Goondiwindi Section.—Here, too, because of the dry conditions the normal demand for stock fell away and crossing movements, particularly to New South Wales, were restricted. The conditions were better in Queensland and this caused a demand for store sheep there. Consequently there was more movement of sheep to than from Queensland. Some lice infestation was discovered on travelling sheep, but generally infestations were less prevalent than in previous years, due to dry seasons and better control.

Cattle Dipping fees amounted to £45 7s. 9d. as against £144 1s. 2d. for the previous year, indicating the decline in movement of cattle. Renewal of the dip yards at Goondiwindi is needed.

The following stock crossed to New South Wales from Queensland: fat cattle 18,121, store cattle 70,162, fat sheep 41,210, store sheep 194,419, fat pigs 24, store pigs 384, loose horses 289. From New South Wales to Queensland the following movements were recorded: fat cattle 8,890, store cattle 15,893, fat sheep 89,392, store sheep 401,156, fat pigs 386, store pigs 155, loose horses 225.

Stanthorpe Section.—Stock from Queensland into New South Wales at the three main crossing places in this section comprised 163,721 cattle and 14,015 sheep. The majority of the stock was admitted without treatment at Wallangarra. Large numbers of sheep and cattle crossed through to Queensland, the majority consigned to Redbank Meatworks, Brisbane.

Queensland Inspectors are co-operating fully in our work and, with very few exceptions, papers concerning stock consignments have been satisfactory. Because of the increasing cattle tick infestation now showing up within Schedule "T", it has been most important to keep close check on all stock coming through from districts in the vicinity of such infestation points. With the close co-operation which exists between the Border staff and the Queensland inspectors the possibility of substitution, or otherwise evading conditions for introduction of stock, is small.

The arrangements to check consignments of poultry, cats and dogs at Wallangarra Railway Station have worked very satisfactorily. Very few consignments now arrive without the required certificates.

Arrangements were made for the Division of Horticulture inspector stationed at Wallangarra to police the regulations concerning consignments of hay and straw, etc., at Wallangarra transshipping yards. The inspector has the work well in hand. The position is now satisfactory.

A limited amount of repair was carried out in the Acacia Plateau section of fence, patrolled and maintained in conjunction with the Darling Downs Rabbit Board, but the repair programme set down for the year could not be completed. The cyclone considerably damaged fencing in the Acacia Plateau section. Further repair work is necessary to bring the fencing to a satisfying standard, but all fencing is at least stock-proof.

In the dry period of the year the border river fell far below summer level and in one section stock have been crossing the river. The land owners on each side were requested to erect fencing to prevent stock from crossing. In most respects the Registered Paddock requirements have been met.

Minor repairs and some gravelling have been done, to keep the dip yards in reasonable condition. A calf dip was constructed by Tancred Bros. at their Tenterfield abattoir. The young calves that were previously dipped at Wallangarra dip, now go through to and are dipped at the abattoir.

Beef Cattle, Horses and Goats Section.**Beef Cattle:**

The Aberdeen Angus Beef Cattle Studs were maintained at Trangie, Grafton, and Hawkesbury Agricultural College. The best of the young bulls were made available to other breeders by sale and a ready demand for them persisted. Twelve head were sold, the average price being a little over £94.

The Hawkesbury Agricultural College Aberdeen Angus Stud has been further strengthened by transferring an outstanding bull and several females from Trangie Experiment Station. The Grafton Experiment Farm's Aberdeen Angus Stud is being used as a testing ground for promising young bulls bred at Trangie. The Trangie Stud has been maintained as a contagious abortion-free herd since its inception. In future it will depend on Strain 19 vaccination for protection against this disease.

Eight head of Aberdeen Angus from Trangie were exhibited at the 1954 R.A.S. Show and all but one were awarded prizes. In all, 10 prizes were gained including 2 Firsts, 1 Second, 6 Thirds and 1 Fourth. Cattle from Trangie were also exhibited at Dubbo and Trangie Shows.

Ten additional females were purchased, from two of the State's leading studs, for the Poll Shorthorn Beef Cattle Stud at Wagga Agricultural College, and at the 1954 R.A.S. Show the Department purchased the Junior Champion Poll Shorthorn bull (2,050 guineas) for that Stud. An area of approximately 100 acres has been set aside for this Stud at Wagga. Because of severe drought, a draft of 58 head of cattle was sent to Temora Experiment Farm on agistment.

Commercial Beef Cattle.—An Aberdeen Angus steer from Trangie Experiment Station exhibited at the 1954 R.A.S. Show won its class on the hoof, also won its class on the hook, and was awarded the Carcase Championship.

Beef cattle investigations, commenced at Grafton Experiment Farm in 1950 were concluded this year. They concerned growth rates of beef cattle steers run on pasture, and were part of the Department's contribution to work sponsored by the Technical Sub-Committee on Beef Cattle Production. Similar investigations, commenced at Leeton Experiment Farm in 1952, and at Belabula Farms, Canowindra, in 1954, are still in progress.

Eighty-five head of beef cattle were sold.

Beef Cattle Breeders Competition.—This competition, conducted conjointly by the Agricultural Bureau of N.S.W., the Rural Bank of N.S.W., and this Department, was held for the second successive year, but under conditions amended to put the smaller men on a better competitive basis. The State was again divided into ten districts for the purpose of judging and the ten district winners were judged for the State Championship.

This competition provided an excellent avenue for extension work at field days on entrants' properties. The 182 entries represented approximately 3,000 head of beef cattle.

Beef Cattle Carcase Competitions.—The Riverina and South-West Carcase Competition for a pen of three fat steers and also the Goulburn and District Fat Steer and Carcase Competition were held for the first time. The first mentioned competition attracted 19 entries and the carcases were judged at Wagga Abattoir by the Principal Livestock Officer. The last mentioned competition attracted 9 entries and the steers on the hoof were judged at the Goulburn A. P. & H. Society Annual Show by the Principal Livestock Officer. The carcases in this competition were judged at the Goulburn Abattoir by an officer of the Department of Commerce and Agriculture.

Beef Carcase Competitions were arranged for Casino and Macksville but abandoned because of the prevailing bad pastoral conditions.

Horses.

Horse breeding continued at Wagga Agricultural College, Hawkesbury Agricultural College, and Trangie Agricultural Experiment Station, but the small Arab Stud at Yanco Experiment Farm was transferred to and merged with the Stud at Wagga Agricultural College.

The Department's 309 horses are made up of twenty-eight Clydesdales, 51 Arabs, and 230 non-pedigree horses. The number of draft horses continued to decrease but at a more restrained rate. The light horse population increased and, for the first time since 1946, it appears that the Department will soon satisfy all its hack requirements from its own sources. A ready demand exists for surplus, purebred Arabs and the few the Department had available for sale were cleared at satisfactory prices.

A total of fifty-two privately-owned mares was sent to Departmental stallions for service, compared with eighty-seven in 1952-53 and 112 in 1951-52. For the first time on record no privately-owned mares were sent to our Clydesdale stallions.

The Department exhibited eight Arabs at the 1954 R.A.S. Show and six were awarded prizes.

Goats.

There are seventy Saanen and nineteen Toggenburg goats on hand at the Condobolin Experiment Farm Studs, an increase of eighteen Saanens and three Toggenburgs. Further goat importation from England early in 1954 included one Saanen buck, one Toggenburg buck and two Toggenburg does. Herd recording of the does in both studs at Condobolin was carried on, for the third successive year.

Considerable difficulty is being experienced in building up numbers in the Toggenburg Stud, but the numbers are small and it is too early to conclude that the Toggenburg does not possess the robustness of the Saanen. However, the birth rate of females has barely exceeded the death rate, since 1948.

Demand for stud bucks of both breeds still exceeds the supply. Of the twenty-one sold during 1953-54, three went to Fiji, two to Queensland, five to Western Australia, one to Victoria, one to New Guinea and the remainder to local buyers. Six privately-owned does were received at Condobolin for service by Departmental bucks.

Eleven stud goats (9 Saanens and 2 Toggenburgs) were exhibited at the 1954 R.A.S. Show, and collected thirteen prizes made up of one champion, four firsts, three seconds, three thirds, one fourth and one commended. The team's performance compares more than favourably with that of 1953, the first occasion on which the Department exhibited at the Sydney Royal Show.

Apiary Section.

Apiarists generally experienced a season below or, at best, just average. On the far north coast the white clover crop failed because of the dry season. Subsequently, otherwise useful areas were ruined, with the loss of many hives by floods.

In some parts of the State good flows occurred, particularly in the autumn and early winter. In the dry winter on the south coast, there has been a good flowering of spotted gum, and many apiarists have already had one or two extractions from this source. Prospects for next season appear good, but late winter rains are needed to ensure the growth of suitable pollen plants for good breeding conditions. This year many beekeepers lost their hives and possessions through bush fires, and many trees were so affected that they will take years to recover.

Bee Disease.—American Foul Brood has been rather widespread, but outbreaks amounted to considerably less than half of the 1952-53 total. Outbreaks would not have been as serious had the beekeepers recognised the disease and taken early action. Other beekeepers have introduced the disease into the apiaries through second-hand materials. The migratory nature of the industry is helping to spread the disease.

Apiary Registration Fees.—It has been necessary to increase Apiary Registration Fees, due to heavy Bee Diseases Compensation payments, following claims in respect of serious outbreaks in 1952-53. This State was the first to introduce a Bee Diseases Compensation Fund. Compensation is encouraging beekeepers to report the disease and have Departmental officers carry out effective control measures.

Apiaries at Agricultural Colleges.—The Department has imported artificial insemination equipment from U.S.A., and a special type of microscope from England. Considerable material has been procured and assembled locally. Apiary officers at Hawkesbury Agricultural College have succeeded in artificially inseminating queen bees and a breeding programme is under way.

Extension and Regulatory Services.

	1952-53.	1953-54.
Lectures and demonstrations	36	32
General inspection of apiaries	526	660
Apiaries noted infested with wax moth	13	33
Apiaries noted infested with brood disease	38	46
Notices for adjustment of hives	36	29
Certificates issued for interstate trade in honey	71	37
Beekeepers registered (1.4.53-31.3.54)	3,330	3,897
Protected apiaries registered	86	84

The Department co-operated with the Commercial Apiarists' Association of New South Wales, the Royal Agricultural Society of New South Wales, and the Producers' Co-op. Distributing Society in staging a live bee and honey extracting demonstration, at the Sydney Royal Show. The demonstrations attracted much attention. Members of the industry expressed their appreciation of the major part played by the Department in organising and staging the demonstration.

Poultry Section.

Poultry School.—Short term schools in poultry and turkey raising were held at Hawkesbury and Wagga Agricultural Colleges respectively. Each school was well attended, by farmers from many parts of the State and, in the case of the Turkey Raisers' School, interstate farmers were also in attendance. One of the two poultry schools conducted at Hawkesbury was for Junior Farmers.

Other Extension Services.—Because less officers were available it was not possible to undertake as much flock culling or to visit as many farmers as during previous years. The activities of the four field officers in the Branch are listed:—

	1952-53	1953-54.
Visits to private farms	1,243	743
Visits to Departmental farms ...	31	20
Visits to Government Institutions ..	11	5
Number of poultry culled	118,000	31,450
Number of breeding stock selected ..	30,250	5,100
Lectures	27	22
Field days for farmers and junior farmers	30	8
Judging at shows	6	10
Chick sexing examinations	2	1
Poultry schools conducted at Hawkesbury Agricultural College and Wagga Agricultural College	—	3

Random Sample Test.—This system of testing poultry has met with marked success and houses are being erected to accommodate increased numbers of birds.

Piggery Section.

As forecast last year, pig production has increased throughout the State and particularly in the north-west, central west and south-western wheat areas. With large stocks of wheat on hand and uncertainty about wheat marketing many wheat farmers have established pig raising units, with a view to marketing some of their crop on the hoof. This trend has persisted despite the heavy fall in pig prices which occurred in 1954.

Extension and Regulatory Services.—The increase of stud and commercial pig herds has increased the demand for the services of livestock officers, both at head office and in country districts. The services rendered are illustrated by the following figures:—

	1952-53.	1953-54.
Farms visited	1,190	1,197
Pig sales attended	73	80
Meetings attended	87	74
Field days attended	39	33
Bacon factories visited	53	39
Experiment Farms visited	87	95
Shows attended	24	30
Lectures and demonstrations given	81	74
Stock Foods Act inspections	39	5
Broadcasts	18	17

All extension work has been directed towards more efficient production of high quality pig meats, and livestock officers have concentrated on raising the standard of breeding, feeding, housing and general management. The range of pamphlets has been kept up to date and enlarged. It is significant that the demand for these pamphlets has necessitated reprinting some of them twice within the year, although 5,000 copies were printed in an issue.

Government Institutions, etc.—Livestock Officers continued to give technical assistance to the Departments of Education, Child Welfare, Health, and Prisons; Agricultural Show Societies, the Agricultural Bureau, and other various farmers' organisations, including the Junior Farmer Club movement, Pig Clubs, the Australian Pig Society; and the Commonwealth Sub-Committee on Pig Production.

Departmental Pig Studs.—The seven Departmental Pig Studs, Hawkesbury, Wagga, Grafton, Wollongbar, Glen Innes, Yanco, and Temora, have been maintained on a satisfactory standard of type and quality. The level of production is illustrated in the following figures:—

	1952-53.	1953-54.
	£	£
Stud pigs sold	469	410
Market pigs sold	408	277
Pigs killed for food	326	350
Approximate value	£17,000	£18,000

Teams from Departmental herds were exhibited at the Sydney Royal and various country Agricultural Shows with success. Award-winning entries were also made in bacon-pig carcass competitions.

Experimental work in nutrition and housing was carried out at Wollongbar, Grafton, Hawkesbury, Temora and Yanco. Twelve demonstrations have been carried out on private farms, under the Commonwealth Agricultural Extension grant, to demonstrate to farmers the results to be expected from the use of antibiotic supplements in pig rations.

Pig Raisers' Schools.—The seventh School of Instruction for Pig Raisers to be held at Hawkesbury Agricultural College since the war was well supported by farmers from many parts of the State. A successful school for central western Junior Farmers was held at Forbes.

Sheep and Wool Section.

The demand for the services of district officers continued to increase, particularly for advice on breeding, husbandry and management problems. Location of a district officer in the Deniliquin district and another with headquarters at Coonabarabran was approved, but it has not been possible to fill these positions.

Wool prices continued on a very satisfactory level, providing rural incomes that allow of considerable expenditure for pasture improvement, maintenance, and capital expenditure on properties. In keeping with the Merino wool market there has been a further slight trend towards Merino wool at the expense of dual-purpose sheep and lamb raising. The unsatisfactory feature in this trend is that many fat-lamb raisers are curtailing their lamb production and running a proportion of Merino wethers as woolgrowers. Another effect of the trend has been the considerably reduced demand for Corriedale rams. In spite of the altered trend of some sheep enterprises in the lamb-raising areas, the industry continued to expand. This sustained the shortage of suitable British breed rams. That shortage is detrimental to the lamb industry. Expanded breeding of British breed rams is being encouraged, not only to supply the present demands, but to cater for future requirements. The shortage of mutton-type rams could result in half-bred rams being retained and used on properties,

Extension Work.—The work of the District Livestock Officers (Sheep and Wool) is summarised as follows:—

	1952-53.	1953-54.
No. of properties visited	1805	1,864
Sheep classed	231,070	381,688
Rams and ewes selected for breeders	7,508	7,622
Value of rams and ewes selected for breeders	£58,272	£69,128
Sheep selected for War Service Land Settlers	13,135	3,769
Value of sheep selected for War Service Land Settlers	£41,762	£15,829
Visits to War Service Land Settlers	231	198
Lectures, demonstrations and field days	120	169
Agricultural Shows, Ram Sales, etc., attended	81	90

Competitions and Field Days.—The Merino Ewe Competition conducted in collaboration with the *Farmer and Settler* Newspaper was continued. A noteworthy feature is the incorporation of a section for sheep husbandry. District winners in this section produced some outstanding performances.

The Fat Lamb Breeders' Competition, conducted in co-operation with the Rural Bank of New South Wales, was also continued. A feature was the interest displayed at field days held in conjunction with the district judging and final judging.

PROJECTS AT EXPERIMENT FARMS AND STATIONS.

Lecton Experiment Farm.—Three lamb-raising trials are proceeding: early lamb production; inheritance of fleshing; and economic return of breeding from young ewes, in comparison with the standard practice. It is noteworthy that the experiments in the production of early lambs resulted in lambs being marketed as early as the 1st July, 1954.

Lecton Experiment Farm is being developed as a pasture and livestock research centre. Considerable expansion of the fat-lamb research programme has been planned.

Yanco Experiment Farm.—Two lamb-raising trials are proceeding: a commercial trial for early lamb production, comparing breeds and crosses; and a supplementary feeding of lambs trial.

Cowra Experiment Farm.—Two lamb-raising trials are proceeding: inheritance of fleshing; and lamb raising under controlled nutritional planes.

Condobolin Experiment Farm.—Dorset Horn x Merino ewes are being bred for use in Departmental lamb-raising trials at other Experiment Farms. For supplementary feeding and drought feeding trials to be undertaken during 1954-55, fencing and water supply are now under construction.

New England Experiment Farm.—The investigations are concerned with the relative economy of dual-purpose breeding and lamb raising under northern tablelands conditions.

Temora Experiment Farm.—A Corriedale strain trial and a long-range programme of breeding hornless Dorsets are in progress. A trial has been planned for the ensuing year, to compare the economy of Corriedales and Polwarths.

Trangie Agricultural Experiment Station.—The sheep on this station are used in breeding trials and research, reported in a foregoing section.

Shannon Vale Nutrition Station.—Studies of the effects of improved pasture and nutritional practice on the subsequent growth and production of sheep, etc., are reported in a foregoing section.

DIVISION OF DAIRYING.

The work of the Division comprised administration of Acts and Regulations; and research and extension services.

General.

Milk production decreased in comparison with the previous year, mainly due to adverse seasonal conditions. Very dry conditions on the north coast during the period July, 1953, to January, 1954, were followed by disastrous floods and continued wet weather. Conditions on the far south coast and in the Riverina have, in general, been very dry throughout.

Milk was again drawn from districts outside the jurisdiction of the Milk Board, to supplement internal supplies and avoid the necessity for milk rationing.

The quality of milk, cream, and manufactured products declined in most districts. This may be attributed in part to the fact that dairy officers were unable to exercise as much supervision as desirable, because of demands made upon their time for flood relief, farm competitions, supervision of Dairy Industry Extension Grant demonstrations, and herd recording duties.

Regulatory Services.

The Acts administered were the Dairy Industry Act, 1915-1951, the Dairies Supervision Act and those portions of the Pure Food Act and Factories and Shops Act which relate to production, treatment and distribution of milk, and amenities, safety and protective measures for employees.

Dairy Industry Act, 1915-1951.

Advisory Committee.—The Committee met on numerous occasions to consider applications for variations of the purposes for which premises could be used, and applications for registration of premises within the meaning of the Dairy Industry Act, 1915-1951.

Appeal Board.—The Appeal Board, constituted under section 24 of the Dairy Industry Act, did not have occasion to function.

Dairy Produce Factories and Stores.—Factory plant and machinery have been kept to a satisfactory standard through the co-operation of factory managers, directors and dairy officers. Modern milk pasteurising and bottling equipment were installed in several centres by dairy companies and firms. Twenty of these plants are now supplying pasteurised bottled milk to country centres.

One new cheese factory was completed at Bodalla on the south coast, extensive alterations and extensions were made to another at Albury, and the Norco Company commenced construction of a large cheese factory at Lismore. No new butter factories have been built but many factories have been altered or expanded.

Two butter factories closed down, Macksville and Southgate, whilst Peters Creameries Pty. Ltd. opened a large milk products factory at Grafton.

The following schedule compares the number of dairy produce factories and dairy produce stores registered during the years 1952-53 and 1953-54:—

	1952-53.	1953-54.
Dairy Produce Factories—		
Butter	61	61
Cheese	12	12
Margarine	9	9
Milk Products	14	15
Butter Processing	4	4
Butter and Cheese Processing ..	2	2
Farm Dairy Produce Premises—		
Butter	4	4
Cheese	4	4
Dairy Produce Stores—		
Ordinary	41	41
Cold	29	30
Total—Dairy Produce Factories	110	111
Total—Dairy Produce Stores	70	71

Factory Operatives.—Examination of factory operatives for certificates of competency in butter making, cheese making and milk grading were conducted at several factories and resulted in the following certificates to successful candidates:—

- Butter Making—25.
- Cheese Making—8.
- Milk Grading—26.

Dairy Science Schools.—Three Dairy Science Schools were held, with a total attendance of forty-seven, and the subsequent examinations resulted in the following certificates:—

- Cream Grading—12.
- Cream Testing—21.
- Milk Testing—18.

Butter Grading.—The butter grading staff of the Department, although depleted, regularly examined the New South Wales butter and cheese received by distributing agents in Sydney and Newcastle. Two officers now located in the Far North Coast Agricultural Region, trained graders of considerable experience, also examined locally manufactured butter prior to it being held in cold stores in the Region. The information obtained by the graders in each case was furnished to factory managers and district dairy officers, to assist in overcoming any quality faults or other difficulties noted at the grading examination.

Considerable quantities of interstate butter for distribution in New South Wales were also examined, at the request of selling agents.

The number of boxes of butter from both interstate and intrastate sources examined by State graders totalled 1,411,765, compared with 1,406,807 in 1952-53.

Because of staff shortage it was not possible to carry out regular analyses of butter for moisture and salt content.

Officers of the Division of Dairying served, as in previous years, as judges and stewards in the Dairy Produce Sections of the Royal Agricultural Society, the North Coast A. & H. Society, Lismore, and the competitions held in conjunction with the annual conference of the Factory Managers and Secretaries Institute, N.S.W. Division.

Choicest Butter Percentage.—The percentage of choicest butter manufactured from cream was 83.3 per cent. based on conditions set out in terms of the Order of Merit published each year for the information of factory managers. The comparative figures for previous years were 95.1 per cent. in 1949-50, 91.5 per cent. in 1950-51, 91.9 per cent. in 1951-52, and 93 per cent. in 1952-53.

Milk and Cream—Grading, and Check on Causes of Inferior Quality.—Officers periodically inspected milk and cream received at dairy produce factories to ensure correct classification according to the quality, for marginal rates of payment, and that butter was packed according to the grade of cream from which it was made, according to legislation. As a result of these inspections twenty-nine special visits were made to dairy premises, to trace obscure and persistent causes of inferior quality in milk and cream and to advise on methods for their elimination.

Margarine.—Permits were issued for the export of 5,693 tons of cooking margarine to other States. The quality of table margarine exported to the other States is obscure as all firms have not furnished particulars pending a decision on the validity of the Act, which has been challenged.

Dairies Supervision Act, 1901-30.

Many new dairy premises have been constructed under the supervision of dairy officers. Their construction is attributed mainly to the farmers' appreciation of more efficient methods of production and to the availability of building materials. Officers inspected 2,935 dairies, and it was found necessary to issue 361 remedial orders.

Pure Food Act, 1908.

Two prosecutions were launched for breaches of the Pure Food Act resulting in total fines of £20, plus costs, £1 4s.

Factories and Shops Act, 1912.

Dairy officers carried out inspections on behalf of the Department of Labour and Industry in the administration of the Factories and Shops Act as affecting the provisions of amenities and protection of employees from dangerous machinery in dairy produce factories.

Production Improvement Project.

Arising from the N.S.W. Food Production Council's drive to increase food production, the Division of Dairying initiated a scheme in January, 1953, known as the Production Improvement Project. This required dairy officers to make a specific attack on the problem of increasing production on each of a number of selected, low-producing farms. This was to be supplementary to the dairy officers' general advisory work, and constituted this Division's contribution to the Co-ordinated Extension Services Scheme.

It was envisaged that this project would provide more concise information on the factors limiting production on low-producing farms, and would indicate the extent by which production might be raised by advice and assistance. Farmers participating were to be advised for a period of three years. Each participating farmer was requested to complete a questionnaire form and up to 30th June, 1954, 264 of these forms were received.

Herd Production Improvement Scheme.

This Scheme, a vital phase of the Dairy Division's work, continued to operate satisfactorily although hindered by resignations of herd recorders and the time lag in their replacement. This caused other officers in the various districts additional work to maintain the Scheme.

Herd Recording.—Some seventy units were maintained with 59,308 cows recorded under the Group Section and 4,240 cows recorded under the Official Section. The grand total of 63,548 cows was a post-war record. Eleven new units are expected to commence in the coming year, but additional herd organising and recording staff will be needed to enhance the effectiveness of the Scheme.

Calf Marking Scheme.—This Scheme was devised as a means of providing positive identification for female replacement stock. There is room for expansion of this activity. During the year 4,352 calves were marked, making a total of 31,264 calves in 992 herds marked to date. Included in the total are seventy-six calves obtained by artificial insemination. Their progress will be closely followed.

Collation of production figures is proceeding. Certain details may be published in the ensuing year.

Certified Bull Scheme.—To date, applications for certification have been received in respect of 517 bulls; and 355 certificates indicating eligibility of those sires' calves to be marked as Merit calves have been issued.

Sire Survey.—Extraction of progeny records continued. A publication covering results to June, 1953, has been with the Printer for some months.

Herd Wastage.—Collation of data is proceeding. It is hoped to collate all data collected over the last few years by using mechanical equipment on a custom basis. Provision for this has been made in the estimates.

It is proposed now to confine services of the one survey officer to the area served by the Berry Artificial Breeding Station.

Dairy Bull Loan Scheme.—This scheme has continued to function and some results are being obtained. Three bulls have been returned for use in Departmental herds.

Publicity.—Publicity of herd improvement matters was continued through the usual press channels and the *Herd Record-ers' Letter* which is now a well established part of the Herd Improvement Scheme.

Bulletins covering herd improvement were revised, and details of Progeny Recorded Bulls and Register of Merit Cows were prepared for publication.

Artificial Stock-Breeding Stations.

Hunter Valley Centre.—The Division continued to co-operate with the Hunter Valley Dairy Company in selecting bulls for use at the Artificial Breeding Centre, Aberdeen.

Berry Centre.—This Centre is working satisfactorily and is encountering a keen demand. Reports indicate that the calves born are high quality.

Individual owners who made use of the service totalled 201. The number of first inseminations was 3,150, approximately one-fifth of the cows in the area. A total of 31,800 miles was driven to inseminate this number of cows, or roughly 12 miles an insemination. In the period from December, 1953, to May, 1954, this figure was reduced to 7 miles an insemination. Conception rates were satisfactory, in the vicinity of 60 per cent. first, 25 per cent. second, 11 per cent. third, at ninety days non-return.

There is a 9 per cent. drop in fertilising capacity of semen from first to third day. Statistically this is highly significant. It could be overcome by keeping more bulls so that more frequent collections could be made. This is done by the English Milk Marketing Board and accounts in part for their higher conception rates.

Control of Government Herds.

Government Dairy Studs continued to receive considerable attention. The Ayrshire herd performed well at the 1954 Sydney Royal Show. The Stud has been strengthened by the importation of a young sire from Scotland, "Carnell Super Quality". He should cement the improvement effected by "Carnell Perfect Pilot".

Departmental Studs have virtually proved "life savers" as sources of Ayrshire, A.I.S. and Friesian bulls for use at the Berry Artificial Stock-Breeding Centre.

Government Farms—Average Production of Dairy Herds.

Herd.	Breed.	1953-1954.				1952-1953.				1951-1952.
		No. Cows.	Milk.	Test.	Butter-fat.	No. Cows.	Milk.	Test.	Butter-fat.	Butter-fat only.
			lb.	%	lb.		lb.	%	lb.	lb.
Hawkesbury Agricultural College	Friesian.....	30	10,146	3.4	347.05	29	9,658	3.6	344.35	372.81
Hawkesbury Agricultural College	Jersey	32	6,397	5.3	337.34	29	6,299	5.3	330.91	361.26
Yanco Experiment Farm.....	Jersey	22	5,249	5.0	262.59	27	6,265	5.3	328.93	353.15
Bathurst Experiment Farm	Ayrshire	25	8,969	4.1	366.33	23	9,160	4.0	364.58	350.49
Wollongbar Experiment Farm	Guernsey	52	5,418	4.8	260.64	45	6,299	4.8	303.40	309.80
New England Experiment Farm	Jersey	25	5,597	5.3	296.50	22	5,805	5.5	317.55	286.79
Grafton Experiment Farm	A.I.S.	55	8,807	4.0	354.87	57	7,281	4.0	292.08	252.09
Wagga Agricultural College	Jersey	30	4,463	4.9	220.82	37	4,085	5.2	211.10	238.93
Wagga Agricultural College	Ayrshire	...	...	...	...	...	...	...	...	213.49

Recorded Progeny of Imported Sires to 30th June, 1954.

Name of Sire.	Daughters Recorded.	Age in years.	Average.			lb. Diff. from Expectancy.
			Milk.	Test.	Butter-fat.	
Ayrshire—			lb.	%	lb.	
Carnell Perfect Pilot (imp.) ...	19	2	6,198	4.2	294	+ 36
	12	3	8,322	4.2	347	+ 58
	7	4-9	9,531	4.1	395	+ 74
Jersey -						
Golden Conqueror (imp.)	22	2	6,015	5.1	308	+ 63
	16	3	6,742	5.0	338	+ 53
	11	4-9	5,861	5.0	305	(314)
Bellavista Samaritan Royal (imp.)	14	2	4,340	5.4	233	+ 2
	14	3	4,826	5.4	261	+ 1
	7	4-9	4,016	5.2	210	(291)
Brampton Records Pinnacle (imp.)	11	2	5,105	5.4	278	+ 33
	12	3	5,579	5.7	316	+ 31
	6	4-9	7,237	5.2	373	(314)
Guernsey—						
Bella Cora's of Royal Star Les Jetteries (imp.)	19	2	5,156	5.1	263	- 11
	16	3	5,732	5.0	280	- 18
	6	4-9	5,185	4.7	245	(354)
Friesian—						
Parkhouse Akirino 2nd (imp.)	9	2	7,957	3.6	287	+ 29 (333)

The right-hand column gives the expectancy rating of the bull. This figure attempts an evaluation of the bull. Thus, "Golden Conqueror's" 2-year-old daughters had a fat production average of 63 lb. above that which could be expected of the daughters of the average bull used in a herd where the mature cows averaged 314 lb. fat. This latter figure is in parenthesis.

As no expectancy table for Ayrshires can yet be adopted in this State, because of the paucity of numbers, the figures given in this column for "Carnell Perfect Pilot" are the differences from the five year breed average of officially recorded cows in each age group, viz., his 2-year-old daughters have a production average 36 lb. above that of the breed.

Education.

In addition to the three (3) Dairy Science Schools held during the year, a Winter School for Dairy Farmers, at which the attendance was thirty-three, was held at Hawkesbury Agricultural College.

Lectures, demonstrations, educational film screenings and broadcasts were also again included in the activities of Dairy Officers.

Dairy Industry Extension Grant.

The grant made available by the Commonwealth Government to improve practices in the State's dairying industry was expended on—

- Grade Herd Recording,
- Demonstrations on farmers' properties,
- Salaries and expenses of organising officers,
- General publicity and extension work,
- Sire Surveys,
- Wastage Surveys,
- Artificial Stock-Breeding Centre, Berry,
- Purchase of Bulls for the Artificial Stock-Breeding Centre, Berry.

Advisory Committee.—Two permanent Departmental officers, a senior agronomist and a senior dairy officer, continued to deal with routine work previously handled by the Dairy Industry Extension Grant Committee, up to the retirement of the senior agronomist, Mr. G. T. Dawson. Since the retirement of Mr. Dawson, the services of the appropriate officers of the Division of Plant Industry have been co-opted as needed, in an advisory capacity.

Staff.—Dairy Industry Extension Grant staff consists of a senior organising officer stationed in Head Office, Sydney, five organising officers in the field, an editorial assistant and a technical assistant in the photographic aids section of the Division of Information and Extension Services.

Demonstrations.—Of the 160 demonstrations established prior to 30th June, 1953, 149 have been terminated. It is intended to carry on the remaining eleven for a further period of twelve months.

During the past twelve months, 103 farm demonstrations have been established under a new policy whereby approximately 10 acres of improved pastures are established on each farm selected. In most cases an electric fence has been supplied for strip grazing, in addition to the seed and fertilisers. Under the agreement with the Department, the farmer undertakes to establish a further 10 acres at his own expense at the conclusion of the demonstration.

Future Demonstrational Work.—It is intended to carry on with the new scheme during 1954-55, and it is expected that approximately 100 additional farm demonstrations will be established. Maintenance of pastures established on the 103 farm demonstrations during 1953-54 and on the eleven demonstrations mentioned previously, will also be carried out.

Demonstration Results.—The establishment of pastures during the year 1953-54 has, in the main, been successful. Floods on the far north coast upset programmes in some cases. Extremely dry conditions retarded pasture growth on the far south coast.

Demonstration No. 156, Nowra.—The property consists of 85 acres of which 45 acres have been laid down with improved pastures. Production figures (overall rainfall 40 inches) were:—

Year.	Cows Milked.	Milk, lb.	Average per Cow.	Production per Acre.	Rainfall Points.
1951-52 (Base Year)	34	138,699	4,079·4	1,632	5,480
1952-53 ...	30	170,514	5,683·8	2,006	4,652
1953-54 ...	31	224,085	7,228·5	2,636	2,699

Cost of seed, lime and super. (for 1952-53) and super. (for 1953-54) was £8 6s. 1d. *per acre* (2 years total). Production *per cow* 1953-54 shows 77·2 per cent. increase over the base year.

Demonstration No. 214, Coolongolook.—Strip grazing commenced on 28th May, 1954, on an area of 6 acres, just short of eight weeks after sowing. The pastures were 9 in. to 12 in. high. The owner was forced to bring all his dry stock in to keep up with the growth. There were only eight stale cows and one heifer being milked at the time, but production rose from 8 gallons per day to 16 gallons per day, equivalent to a weekly rise of £10 on the present milk quota.

Dehorning of Dairy Stock.—Dehorning of stock continued to be a feature of the Grant's activities.

Field Days.—Twelve successful field days were held on demonstration farms. Attendances varied from thirty-five to eighty. The number of field days compares unfavourably with that of the previous year, but drought periods followed by floods were the reason.

DIVISION OF SCIENCE SERVICES.

Biological Branch.

Plant Pathology Section.

NEW PLANT DISEASES.

Seventy-four new diseases were recorded, but most may have been in the State for some time. The great majority were of minor importance, and on plants of little or no economic significance. Two which are potential dangers to their respective crops are pink rot (*Phytophthora erythroseptica* Pethybr.) of potato and crinkle leaf virus of lemon.

CEREAL DISEASES.

Wheat.—Despite the dry winter, the crops finished surprisingly well, and damage by diseases was slight. Bunt (*Tilletia caries* and *T. foetida*) was, for the second successive year, more prevalent than in the past, particularly in the Manilla and Wyalong districts. Proper use of fungicidal, seed dusts by growers would virtually eliminate this trouble.

The Uniform Disease Nursery.—The Wagga Agricultural Research Institute has now taken over this project. It will not in future be part of the Biological Branch's investigational activities.

Oats.—Grey speck, recorded in this State for the first time in the previous year, was not observed this year. Leaf rust (*Puccinia coronata*) was the most serious disease affecting hay crops of oats, while the smuts (*Ustilago avenae* and *U. kolleri*) were troublesome in the grain crops. The Uniform Disease Nursery and Oat Smut Control Projects are now controlled by the Wagga Agricultural Research Institute.

Rice.—The New South Wales crops continued to be free from parasitic diseases, but several diseases are now known to be in northern Australia and seed affected with disease continues to be introduced there. Investigational work on the disinfection of rice seed imported for sowing in northern Australia was continued. The previous finding that none of the treatments used completely eliminated *Helminthosporium oryzae* was confirmed. The warm water, formalin and panogen treatments again reduced infection to a very low level. Panogen, however, continued to be the most reliably effective, and had little or no effect on germination except in the case



(Photo. from Mailland Office.)

Many 10-acre sown pasture demonstrations have been established on coastal dairy farms, and are increasing the effectiveness of dairy industry extension service.



Phytophthora effects on Rough Lemon stocks in Nursery Rows on old orchard land. The illustration emphasises the importance of the recommended Trifoliata stock. The possibility of still better citrus stocks is being explored in the Department's experiments.

of a new importation of it which injured the seed when used at strengths greater than 2½ fluid ounces per bushel. Whatever the treatment, it is recommended that a trial sample be first treated because some batches of seed are very easily injured.

Maize.—Leaf rust (*Puccinia sorghi*) and leaf blight (*Helminthosporium turcicum*) were unimportant in most areas, after last year's unusual prevalence. Leaf blight, however, caused some yield reductions on the south coast. As there are other rusts and other species of *Helminthosporium* on maize in other parts of the world, the examination of collections, commenced last year, continued. Only the one rust has been found, but an unidentified species of *Helminthosporium* from Grafton was shown to be pathogenic in glasshouse tests. A bacterial leaf blight damaged certain lines at Glen Innes.

A survey of properties adjacent to the boil smut (*Ustilago maydis*) quarantine areas at Bathurst revealed no trace of the disease. It is hoped that it has been eradicated, but it is highly desirable that the restrictions remain for some time and that periodical surveys be made. The fungus is able to survive in soil for many years.

DISEASES OF OTHER FIELD CROPS.

Clovers.—Anthracnose (*Colletotrichum trifolii*), observed on red clover for the first time last year, was not recorded this season. Seventeen parasitic diseases of clovers have now been recorded in New South Wales and of these the rusts are undoubtedly the most destructive. Subterranean clover rust (*Uromyces trifolii subterranei*) causes severe damage annually on the coast and tablelands. Virus diseases are widespread and, although of limited importance in most clovers, caused reduced growth and in some cases death of subterranean clover. A leaf spot of this host caused by *Cercospora* sp. was recorded for the first time, at Taree. The stem nematode disease (*Ditylenchus dipsaci*) of white clover recorded for the first time in the Berry and Nowra districts, killed many plants in low-lying areas. Control of these diseases would depend on introduction or development of resistant or tolerant varieties.

Lucerne.—The disease position remained unchanged. Surveys showed that stem canker and crown rot (*Rhizoctonia solani*) can thin stands during warm weather.

VEGETABLE CROP DISEASES.

Bean Seed Certification.—The Bean Seed Certification Scheme continued for the eleventh successive year, with the co-operation of Division of Plant Industry. A total of fifty-three crops on 232 acres was passed for certification. Applications initially lodged were for 321½ acres. The estimated yield of certified seed was 3,940 bushels, comprising 2,660 bushels (67.5 per cent.) of Brown Beauty, 440 bushels of Wellington Wonder, 340 bushels of Windsor Longpod, 260 bushels of Tweed Wonder,

130 bushels of Hawkesbury Wonder, and small quantities of Clarendon Wonder, Goward's Special and Richmond Wonder. Of the seventeen crops rejected, fifteen were rejected because they had been picked for the green bean market, one because of anthracnose and one because of severe development of scald.

Bean Anthracnose.—Only one case of bean anthracnose (*Colletotrichum lindemuthianum*) was seen on the south coast in bean crops for certified seed; probably due in part to the dryer season and to widespread use of Brown Beauty lines resistant to Strain 1, the strain present in that area. However, green bean crops on the north coast were severely anthracnosed during the very wet May of 1954. Plants were heavily attacked and the pods were severely spotted. Several infested consignments also arrived at the Sydney markets.

The Vickery strain of Brown Beauty on the south coast was outstanding both for anthracnose resistance and yield. No anthracnose has been found in this line on the south coast and it now seems 100 per cent resistant to Strain 1. It yielded up to 300 bushels of green beans per acre over three pickings. Its seed yields should also be good.

The search continued for bean varieties resistant to both of the strains of the anthracnose fungus known to be in New South Wales. A field selection from a Hawkesbury Wonder line has shown marked resistance to Strain 1 (the more widespread) and may represent a natural cross between Hawkesbury Wonder and some other resistant variety. The selection is slightly taller and more prolific than Hawkesbury Wonder. Further work on it may yield another good commercial variety resistant to Strain 1.

In co-operation with the Division of Plant Industry, many lines of crossbred seed have been resistance tested in the glasshouse. In the crosses, commercially desirable but susceptible varieties are crossed with poorly commercial but resistant varieties. The progenies are tested. Already some promising lines highly resistant to both strains of anthracnose have been obtained. Results should also provide information on the mode of inheritance of resistance to anthracnose in several bean varieties.

Seed of varieties reported as resistant to various strains of anthracnose overseas have also been introduced. Preliminary tests indicate that several may be quite susceptible to at least one of the strains present here.

A few small tests indicate that seed carry-over of anthracnose is much more important than soil carry-over. Ground carrying a heavily diseased crop nine months before was planted with seed of a susceptible variety and no diseased plants were produced, whereas seed from a diseased crop produced numerous diseased plants.

Bean Rust.—Over the past two or three years bean rust (*Uromyces phaseoli typica*) has become increasingly severe, especially in coastal areas. Many crops have been severely defoliated, with a consequent loss in yield. In co-operation with the Division of Plant Industry, crosses are being tested for rust resistance in glasshouse inoculation tests. This work is integrated with the breeding programme for anthracnose resistance.

Mottle Leaf of Beans.—For many years, the hereditary abnormality known as mottle leaf was prevalent in some lines of Tweed Wonder beans. This condition is seed transmitted, mottles the leaves and probably reduces their yield. In affected lines of seed, up to 40 per cent. of mottle leaf plants may be produced. In an attempt at elimination, all mottle lines of Tweed Wonder were rejected from the Seed Certification Scheme. That measure seems to have reduced considerably the amount of mottle leaf present in Tweed Wonder.

Potato Scab (*Actinomyces scabies*) Resistance Trial.—In co-operation with the Division of Plant Industry, this trial has been conducted at Spring Hill for the six years, 1947-53. The results had shown that the United States varieties Ontario and Menominee in particular, and a number of other varieties and seedlings, had promising scab resistance in the Spring Hill area, where severe attacks of soil-borne scab can often nullify the effects of dipping seed of the common commercial varieties. The trial in its present form has yielded sufficient information for promising scab resistant varieties and seedlings to be included in the Department's potato breeding programme, for the further evolution of scab resistant seedlings adaptable to the central tablelands and possibly other areas.

Pink Rot of Potato.—This disease caused by the soil inhabiting fungus, *Phytophthora erythroseptica*, was recorded for the first time in this State in a number of crops at Hanging Rock, Tamworth district. Losses ranged from 3 per cent. to 40 per cent. in individual crops. The fungus is most active under conditions of high soil moisture, and the greatest losses were sustained in the lower lying sections of the fields at Hanging Rock. It is fairly certain the disease has occurred there in previous seasons and been confused by growers with late blight (*P. infestans*). At present it is only of local importance.

Purple Top Wilt of Potato.—In New South Wales this disease is caused by the tomato big bud virus. Studies were concluded during the year. The virus can be readily transmitted from potato to tomato by grafting, but the reproduction of the disease on potato from affected tomato plants is more difficult. Sixty attempts were made and in three cases the buds survived for two weeks and thereafter grew vigorously on the potato. Early symptoms of purple-top wilt which developed on the potato in from thirty-seven to forty-nine days were followed by other symptoms described as occurring in the field except the production of very flabby tubers. While there is adequate proof of the identity of the causal virus of potato-tip wilt, the difficulty in reproducing the disease on potato by budding and grafting methods may be, as has been suggested, related to the hypersensitive reaction of the potato phloem to this virus.

Fusarium Wilt of Tomato.—For the second year in succession the incidence of fusarium wilt (*Fusarium oxysporum* f. *lycopersici*) was low in crops of Grosse Lisse, the most popular commercial mid-season tomato. In co-operation with the Division of Plant Industry, further field tests were conducted to determine fusarium wilt resistance of established varieties and segregating hybrid lines of tomatoes. This work is being continued.

Small scale plot tests in soil heavily infested with *Fusarium* further confirmed the high field resistance of Grosse Lisse, as compared with the fully susceptible variety, Rouge de Marmande, under normal weather conditions. This experiment also indicated that although Grosse Lisse is fully susceptible to *Verticillium dahliae*, it is highly tolerant of the disease during warmer weather.

Virus Diseases of Tomato.—An unnamed tomato virus disease causing yellowing and downward rolling of margins and tips of tomato leaflets, particularly at the growing points of the plants, was again widely distributed throughout coastal areas. Efforts to transmit it other than by grafting have been unsuccessful. Identity and method of distribution of the virus in the field remain unknown.

A virus disease of tomato apparently undescribed elsewhere has caused economic losses in glasshouses in the Warriewood-Mona Vale area during the past few years. Locally designated "drop head wilt," the disease is characterised by a mid-day wilt of the growing point and ultimately a permanent collapse of the whole plant. The cause of death is necrosis of the main and secondary roots. The disease has been reproduced under experimental conditions and has been shown to be caused by a virus capable of inducing necrotic local lesions on a wide range of solanaceous plants. Investigations are being continued.

Fusarium Root Rot of Cucurbits.—Further work has shown that the causal fungus (*Fusarium solani* f. *cucurbitae*) has survived in a sandy loam soil for twenty-eight months after the soil has been infested. Only one record of this disease was made in the past year, and in this case the infection apparently arose from infected seed. Work is being continued to determine the possibilities of hot water seed treatment and of corrosive sublimate seed treatment as methods of control.

Beet Eelworm (*Heterodera schachtii*).—Host range tests were conducted with an isolate of the beet eelworm obtained in early 1953 from Milperra. The eelworm was found to complete its life cycle on table beet, silver beet, rhubarb, brussels sprouts, broccoli, cauliflower, cabbage, kohlrabi, radish, rape, turnip and bean. These plants are all reported overseas to be hosts of this parasite.

Vegetable Diseases caused by *Rhizoctonia* spp.—The root and crown rot diseases of vegetables in New South Wales caused by species of *Rhizoctonia* are now being investigated. Preliminary culture studies show that most of the isolates so far examined have a high optimum temperature for growth.

Mushroom Diseases.—Commercial mushroom crops in the Oakville-Maraylya district near Sydney have been surveyed; 90 per cent. of the mushrooms offered for sale in the Sydney markets are produced there. The surveys indicated that under the outdoor system of ridge bed growing parasitic diseases do not reduce yields appreciably, as high humidity and poor ventilation do not occur in the ridge beds for long. The disease known as "mildew" or "cob-web" (*Dactylium dendroides*) was recorded for the first time in this State, at Lilyvale. The affected mushrooms were being grown in a tunnel.

Mushroom Spawn.—The quality of commercially produced mushroom spawn has been checked at intervals and found to be satisfactory. Two more spawn producers have entered the field, making a total of four—sufficient number to supply the industry. The Department has now withdrawn from sales of mushroom spawn direct to the public, but maintains mother cultures which are available to spawn producers.

CITRUS DISEASES.

Root Rot.—Very dry winter and spring weather resulted in little activity of *Phytophthora* diseases. Replanting *Phytophthora*-devastated areas in the Hawkesbury River districts and in the Murrumbidgee Irrigation Areas with trees on trifoliata rootstock continues. Mature trees affected by root rot in the 1949-52 series of wet years are still declining, particularly at Ourimbah and Lisarow where there is a considerable acreage of mature to old trees, on lowland soil, which are no longer profitable and cannot be rehabilitated.

Scalybutt (*Virus*).—In collaboration with the Division of Horticulture, further outstanding trees of Valencia and Washington navel oranges, Marsh grapefruit, and mandarin, on trifoliata stock, have been selected for propagation as possible sources of certified budwood. Minor varieties whose performance on trifoliata is not known have also been propagated with a view to finding satisfactory bud sources. Investigation of the cause of stunting on trifoliata and its relationship to scalybutt was continued. Strains of scalybutt differing in virulence are also being compared.

"Sudden Death".—Further cases of this disease of citrus on trifoliata occurred at Terrigal, Koraleigh, Curlwaa, Dural and Dooralong. No progress has been made in the isolation of its cause.

Tristeza-Stem Pitting Virus Complex and Yellows Virus.—Further unsuccessful attempts were made to separate the yellows virus of citrus from the tristeza-stem pitting complex (a) by aphid transmission, varying times of feeding and (b) recovery of virus from seedlings of sweet orange, mandarin and rough lemon shortly after inoculation, at varying distances from the point of inoculation.

Surveys of grapefruit, particularly at Narromine, located trees affected with an extremely mild strain of stem-pitting virus which caused no stunting, pitting or fruit malformation. Buds from these trees and from mildly affected trees at Gosford have been used in propagations to determine the stability of symptoms under orchard conditions. Testing of stock/scion responses to virus infection continued.

Enation Virus.—This virus, described recently from South Africa and California, has been found in New South Wales. No detrimental effect on tree condition has been traced to its presence.

Psorosis-type Diseases.—Further surveys and propagations have been made to elucidate the relationship between the disease tentatively diagnosed three years ago as Florida gummosis and several outbreaks of psorosis-like disease and true psorosis A. Great variability of symptoms has been found in trees affected with Florida gummosis at Narromine, Curlwaa and Barooga.

Lemon crinkle leaf virus was identified at Narara citrus experiment station, affecting trees of a Lisbon strain, Belaie and Villa Franca varieties. It was later found in 48-year-old Eureka lemons at Gosford. The origin of the infection, which is occurring in pedigreed trees, and its possible means of spread, are under investigation. The extent of infection in commercial orchards and its economic significance will be surveyed.

Winter Yellowing.—Trees affected in winter, 1953, completely recovered during the following spring. Yellowing again showed up in some Windsor and lower Murray orchards in May, 1954, on trees in the two- to five-year age group. Incidence was lower than in the previous two years. This season the onset of yellowing occurred well before the first cold weather, and it is now evident that low temperatures are not directly responsible. The nutritional balance of the affected trees is being investigated.

Septoria Spot of Citrus (*Septoria depressa*).—For the third successive season septoria spot of citrus has been of no economic importance in the Murrumbidgee Irrigation Areas, the main region of occurrence in New South Wales. The relative absence may be partly attributable to seasonal conditions but the general application of fungicidal sprays at critical periods has played a large part. Fruit inoculations confirm a previous observation that Thompson navel oranges are slightly more susceptible than Washington navel oranges and that Valentias are comparatively resistant. Peak infection is most likely to occur during April and May.

Mandarin Brown Spot.—For some years brown spot of mandarin was considered caused by a bacterial pathogen though efforts to produce the disease with isolates from affected plants were unsuccessful. There are now strong indications that a bacterium consistently isolated from affected material and which causes typical symptoms of the disease when used under special conditions, is the pathogen responsible for brown spot. In a small scale spraying test Zineb has shown sufficient promise of controlling brown spot to justify a more extensive trial next spring.

Green Mould of Citrus; Wastage Investigations.—In co-operation with the Division of Horticulture, and the C.S.I.R.O. Division of Food Preservation, investigational work continued on the relationship of fruit wastage and spore load of *Penicillium digitatum*. Despite the encouraging control of mould development shown by sodium-ortho-phenyl-phenate last year, inconclusive results were obtained this year in the two large-scale spore load experiments. This inconsistency was attributed to a possible variation in the fruits' intrinsic resistance to green mould wastage at different stages throughout the season.

Further aspects of the promising fungicidal value of 2 per cent. sodium-ortho-phenyl-phenate as a dip for green mould prevention have been followed up, particularly in respect to minimising possible fruit injury after treatment.

DISEASES OF DECIDUOUS FRUITS.

Black Spot of Apples (*Venturia inaequalis*).—Early spring and late autumn favoured infection but control was generally satisfactory where adequate spray schedules were applied. However, many growers suffered heavy losses, especially from late autumn infection.

Ascospore discharge studies were continued. The peak period of perithecial maturity was late but approximately coincided (for the sixth successive year) with the petal-fall period. That consistency has led to alterations in timing and concentrations in spray programmes. The main emphasis has moved from the "greentip-spurburst" period, formerly regarded as the most critical, to the "petal-fall" or, more broadly, the "pinkish-first cover" period. Greatly improved control has been achieved by many growers who have shortened the spraying interval during the latter period.

In a fungicide testing experiment at Batlow comparing six different fungicides, the recommended lime sulphur schedule proved superior. Some of the organic fungicides gave commercially satisfactory results, with thiram the best of them. Under severe infection conditions in the 1949-50 season thiram was significantly superior to lime sulphur. Subsequently, it has been so satisfactory in experiments conducted by this Department, by manufacturers and by growers that it has been written into Departmental recommendations as the most suitable alternative to lime sulphur.

A tree reaction experiment at West Pennant Hills confirmed numerous field observations by demonstrating that thiram causes a mild "thinning" of Granny Smith apples. Thiram caused no leaf or fruit injury, even under extreme heat (108° F.), whereas under these conditions lime sulphur injury was severe. Thiram caused no injury when applied soon after a Bordeaux mixture spray or when mixed with Bordeaux.

An experiment at Orange raised new hopes of eradicating black spot. Three heavily infected Delicious trees were sprayed in May, 1953, just prior to leaf-fall, with sodium dinitro orthocresylate (0.5 per cent.), sodium pentachlorophenate

(0.5 per cent.) and phenyl mercuric chloride (0.3 per cent.), respectively. The latter prevented the fungus from entering the saprophytic phase and consequently no perithecial development or ascospore discharge occurred. No tree injury was observed. The other two materials reduced ascospore discharge but otherwise failed to interrupt the fungus life cycle. Prior to leaf-fall in the autumn of 1954 three small orchards, isolated and heavily infected, were sprayed to determine the possibility of eradication of the disease: one orchard at Yetholme was sprayed with phenyl mercuric chloride (P.M.C.) at 0.3 per cent., one at Orange with P.M.C. at 0.1 per cent., and one at Batlow with phenyl mercuric acetate at 0.1 per cent. Also, at Batlow fourteen single heavily infected Granny Smith trees have been sprayed with varying concentrations of P.M.C., phenyl mercuric acetate and phenyl mercury dinaphthylmethane disulphonate in attempts to determine the minimum concentration of P.M.C. for eradication and to compare with it the two other organic mercurials.

Black Spot of Pears (*Venturia pyrina*).—Infection was slight, due to early season control and because most pears were harvested prior to the conditions which favoured autumn infection of late apples. Thiram continued to give excellent result on all varieties of pears, with no foliage or fruit injury. It has been written into Departmental recommendations for all varieties, as an alternative to the present sulphur recommendations.

Powdery Mildew of Apples (*Podosphaera leucotricha*).—Infection was heavy, especially in coastal orchards. Observations over six years have shown that thiram does not stop powdery mildew infection. Consequently, thiram for black spot control has been recommended only for varieties least susceptible to powdery mildew.

Limb Canker of Apples (*Botryosphaeria ribis*).—A long term experiment to yield information on time of infection and possibly on control has commenced in a Dural orchard where five treatments have been applied to Willie Sharp and Early McIntosh trees four years old. All cankers were excised prior to commencing the experiment.

Apple Mosaic (*Virus?*).—This disease is thought to be of virus origin. Symptoms were common this season. In a block of three-years-old Jonathan apples at West Pennant Hills, trees were rated for severity of symptoms. Observations will be made on annual incidence within trees and the rate of spread. The increasing incidence of this disease is perturbing.

Pear Blast (*Pseudomonas syringae*).—Widespread infection occurred, especially on Packham's Triumph, causing some blossom blight, some fruit lesions and general superficial shoot infection. It is suspected that this disease may have been responsible for excessive fruit shedding in the variety Packham's Triumph.

Brown Rot of Stone Fruits (*Sclerotinia fructicola*).—Substantial mid-season dessert peach losses occurred in coastal districts. Infection was negligible elsewhere.

In an experiment in Shanghai seedling peaches at Dural, thiram (0.12 per cent.) and captan (0.1 per cent.) gave significantly better control than wettable sulphur (0.29 per cent.) and 9,10—phenanthraquinone (0.1 per cent.).

A plot for demonstration of control was again maintained in a cherry orchard at Orange. In the Murrumbidgee Irrigation Areas field experiments involving preharvest sprays failed to yield reliable data, due to the very low degree of infection. Inoculation tests on Trevatt apricot, and Elberta peaches at Leeton showed that susceptibility to blossom blighting increased as the flowers opened, but by the time the "petal-fall" stage had been reached the probability of infection was greatly reduced. However, infection at "petal-fall" sometimes resulted in the development of "premature" brown rot mummies. There was indication of latent infection of fruit during the flowering period.

Bacterial Canker (*Pseudomonas syringae*).—Young cherry trees were again damaged, but infection incidence was lower than last season. A spraying experiment commenced on young cherry trees at Orange was abandoned because of change in ownership of the property.

Virus Diseases of Stone Fruits.—In preliminary surveys, symptoms closely agreeing with those described for some of the stone fruit virus diseases of North America, were observed on cherries, peaches and nectarines. The following conditions were noted: cherry mottle leaf occurring widely in the variety St. Margaret and occasionally in Florence; cherry crinkle leaf in one orchard in Werder's Early Black; cherry tatter leaf fairly widespread, mostly in St. Margaret; peach rosette mosaic in severe form in some Goldmine nectarine orchards and on J. H. Hale peach in one orchard.

Crown Gall (*Agrobacterium tumefaciens*).—Seedlings of self-fertilised white-fleshed peaches were raised for use in determining their relative susceptibility compared with the standard stock, the yellow-fleshed variety Pullars Cling.

Black Heart (*Verticillium dahliae*).—Investigations into the relative susceptibility of stocks for stone-fruit trees were continued at Leeton. Indirect inoculation by way of infected tomato plants was only partially effective, and direct stem inoculations were made.

Shot Hole of Apricots (*Clasterosporium carpophilum*).—An experiment for control of shot hole of Trevatt apricots at Leeton was carried into its fourth year. The existence of two separate conditions was demonstrated on fruit, viz., "shot hole" and a "shot hole-like" lesion. The latter appears early in the season irrespective of spraying, but the blemish disappears from the fruit shortly before harvesting; its cause is unknown. The symptoms are very similar in the early stages but the "shot hole" scabs do not slough off readily on maturing fruit. The experiment indicated that control may be improved by spraying at early blossoming rather than at budswell. Confirmatory tests have been initiated.

Cherry Leaf Spot (*Coccomyces hiemalis*).—This disease was not detected. It is now three years since the last outbreak occurred.

DISEASES OF TROPICAL FRUITS.

Bunchy Top of Banana.—Successful control was maintained, but incidence increased slightly. Figures compiled by the Division of Horticulture showed 3,104 diseased plants, as against 2,427 for the previous year. However, the acreage planted to bananas increased by approximately 4,000 acres, so the percentage of Bunchy Top per acre only slightly increased on the previous year. A feature was the increased infection in the latter six months of the year and the occurrence of the disease as isolated infections in the respective affected plantations. Thus it was not possible to identify and deal with the source of infection as in the past.

DISEASES OF VINES.

The cause of the "dying vines" disease of sultanas and Gordo Blanco grapes was further investigated. Grafts made two years ago, from affected vines to healthy sultana and Gordo Blanco vines have not produced symptoms of disease. It is concluded that a virus is not involved. Several fungi isolated and also pieces of diseased vine wood have been used for inoculations of a number of grape varieties.

Sultana vines which last spring (Annual Report 1952-53) suffered delayed dormancy recovered during the summer. A further fairly widespread development occurred in the spring of 1953. Two-year-old vines which had made unusually vigorous growth in the autumn were again involved.

Montils and Rhine Riesling vines at Cessnock, which last year showed virus-like symptoms (Annual Report 1952-53) recovered towards the end of the summer and showed no recurrence of symptoms in the following spring. Grafts and cuttings failed to develop symptoms. Extension of the condition did not occur.

Suspected potash deficiency was suspected of causing widespread leaf scorch and poor cropping in the Cessnock district during the summer.

Soil applications of potash made three, four and five years ago in an experimental plot are associated with the recovery of vines.

Interveneal yellowing and scalding of leaves of Muscatel varieties at Fairfield have responded well to an application of dolomite made fifteen months ago.

Departmental recommendations that the organic fungicide T.M.T.D. replace Bordeaux mixture for control of black spot (*Gleosporium ampelophagum*) of the more susceptible grape varieties have been adopted by growers in the Murrumbidgee Irrigation Areas.

The considerable yield response exhibited by Gordo Blanco grapes to application of Zinc Bordeaux sprays in 1951 and 1952 was not evident in 1953, when control plots yielded more prolifically than is usual with this variety. Explanation of this phenomenon is not apparent.

DISEASES OF ORNAMENTALS.

Snapdragon Rust (*Puccinia antirrhini*).—Studies on uredospore longevity indicated that uredospores could remain alive for 116 days under conditions of low temperature and relative humidity, and that as both temperature and humidity rose their longevity decreased. It would thus seem, with air travel and the dry conditions prevailing in seed samples, that viable uredospores could be introduced with seed and dusted accidentally on to healthy plants. Investigation of the race of rust present indicated that it is similar to that known in America as race 2. All varieties inoculated have proved susceptible to infection with this race. The susceptibility of all the varieties being grown was undoubtedly important in the rapid spread of the disease throughout eastern Australia.

The initial direction of spread of rust in New South Wales during its first known three months was to the south-west and has been correlated with the direction of the prevailing winds in that period, indicating that wind-borne uredospores

were the main initial agents of spread. Later, transport of diseased seedlings to other parts of the State and other States established points from which further spread by wind-borne spores could occur. It is possible that the outbreak in New Zealand in December, 1953, had its origin in wind-borne spores carried from eastern Australia.

Quarantine Interceptions.—Branch officers continued to act as examining plant pathologists under Plant Quarantine Regulations. Introduced material being propagated in nurseries registered as Quarantine Areas was also inspected.

Of thirty-four samples of gladiolus, mostly from Holland, seven were found infected with dry rot (*Sclerotinia gladioli*); eight with yellows (*Fusarium orthoceras* f. *gladioli*); two with seab (*Bacterium marginatum*); two with penicillium rot (*Penicillium gladioli*); six with basal brown rot (*Fusarium oxysporum* f. *gladioli*); and one with core rot (*Botrytis* sp.). This high incidence of disease in gladiolus has caused the gazettement of a regulation restricting to five corms the individual importation of any one variety.

Other diseased plants intercepted included *Cymbidium*, carnation, currant, potato, bent grass and *Citrus* spp. Almost all bulk importations of rice seed intended for propagation in north-western Australia were observed to be infected with disease, chiefly brown spot (*Helminthosporium oryzae*).

Revision of Helworms.—The identification of the species of *Meloidogyne*, which were formerly grouped as the single species *Heterodera marioni*, has commenced. To date *Meloidogyne incognita* var. *acuta* has been isolated from pumpkin (Queensland Blue) from the Botanic Gardens, and *M. incognita* from tomatoes (variety unknown) from Balmain.

Bacteriological Section.

Bacteriological examinations of samples of butter, cheese, cream, bread, water, wine, margarine and other products, proceeded. The supply of tested pure strain "starter" cultures to the cheese and wine industries was maintained.

Dairy Science Instructions.—Instruction in dairy bacteriology was given at a number of dairy science schools conducted by the Division of Dairying at various butter factories.

Bacteriological Quality of Butter.—Statistical evaluation of data from investigations of bacterial counts and the size and number of water droplets in butter led to the following conclusions:—

(a) The multiplication of bacteria in butter is inhibited if the diameter of the water droplets is below 20 μ but takes readily when the diameter of the droplets falls in the range 20 to 40 μ . (b) The extent of the multiplication of bacteria in butter is directly proportional to the total volume of water which occurs as droplets with diameter of 20 to 40 μ .

Results from two years' investigation indicate that agar strips in test tubes are an economical means of determining bacterial types and approximate numbers of micro-organisms in dairy products. If a more accurate count is required, the Petri-dish method should be used.

Cheese Starters.—The nutritional requirements of lactic streptococci are being further investigated. This work may facilitate the formulation of a medium nutritionally efficient for the rapid reisolation of active strains from non-active cultures. The incorporation of partial hydrolysates of milk protein in a synthetic medium is showing promise in this direction.

The development of a simple, easily standardised alternative medium to skim milk for propagation of cheese starters is being continued.

Bee Diseases.—Numerous specimens of diseased bees and brood comb were received for diagnosis. The adult bee specimens included bees killed by Nosema, paralysis, May sickness and various forms of poisoning. The specimens were mostly cases of suspected American Foul Brood or Sac Brood requiring confirmation.

Biological Surveys.—Biological surveys of dairy factory and dairy farm premises included investigations of the purity of water supplies, and the sanitary conditions of factory equipment. Special attention was paid to the presence of proteolytic and lipolytic *Pseudomonas* spp.

Nitrogen-fixing Bacteria.—Due to the heavy demand for peat cultures of nitrogen-fixing bacteria, commercial firms were encouraged to undertake the production of peat cultures from mother cultures supplied by this Department. As yet, few of the resultant commercial cultures have been examined but plans have been made for regular detailed examination of samples from each firm. As a further safeguard, fresh mother cultures continually tested in the Biological Branch for effectiveness and invasiveness are regularly supplied to the commercial firms. Plans have been made for field testing of commercial peat cultures in a number of areas in the coming spring of 1954 and autumn of 1955.

Field trials to determine the relative efficiency of a number of *Rhizobium* strains have been laid down at Walcha and Grenfell. Other strain trials sown by officers of the Division of Plant Industry will provide further data on the performance of various strains in different localities.

The search continues for more efficient *Rhizobium* strains. Isolates from different areas are tested for effectiveness against as many host plants as possible, and any obviously superior strains will be retained for field testing.

Entomological Branch.

INCIDENCE OF INSECT PESTS—SUMMARY.

The anticipated extensive outbreak of Australian plague locust occurred during the spring and summer, and a large scale control campaign was carried out. Autumn egg-laying was again heavy in some areas, and extensive hatchings are expected in the spring of 1954. Black beetle was favoured by the dry spring and summer, especially on the north coast, and enormous swarms heavily damaged maize, vegetables, and pastures. Army worms and other cutworms were numerous after the February flooding of north coast rivers, and attacked pastures on the flood plains. Fruit fly, though not abundant in the summer, showed up in large numbers throughout the coastal area after the late summer cyclonic weather. It was also serious in many inland areas. French bean fly was more prevalent than usual in coastal bean crops and was reported from several north-western inland areas. Citrus gall wasp was recorded from new localities in the metropolitan area. Pasture scarab larvae damaged improved pastures in many southern districts whilst other curl grubs caused concern in north coast pastures. Red-legged earth mite was abundant in clover and lucerne, especially in southern districts. Very heavy green aphid infestations of late winter lettuce occurred in the County of Cumberland. Clover infested by aphid caused photosensitization of sheep in some north-western areas.

The Argentine Ant Eradication Campaign continued satisfactorily. Several new infestations were located but almost all were of less than 10 acres. The present known infested area is approximately 1,750 acres in sixty-four separate infestations.

FIELD AND VEGETABLE PESTS.

Australian Plague Locust (Chortoicetes terminifera).—An outbreak of plague locust in the Central Division, Upper Hunter and parts of the Riverina was the most important single activity occupying the Entomological Branch this year. Hatching of overwintering eggs commenced in late August and continued throughout the spring. Hopper damage to pastures was extensive, especially in some north-western areas, and some crop injury occurred. Flying swarms commenced to

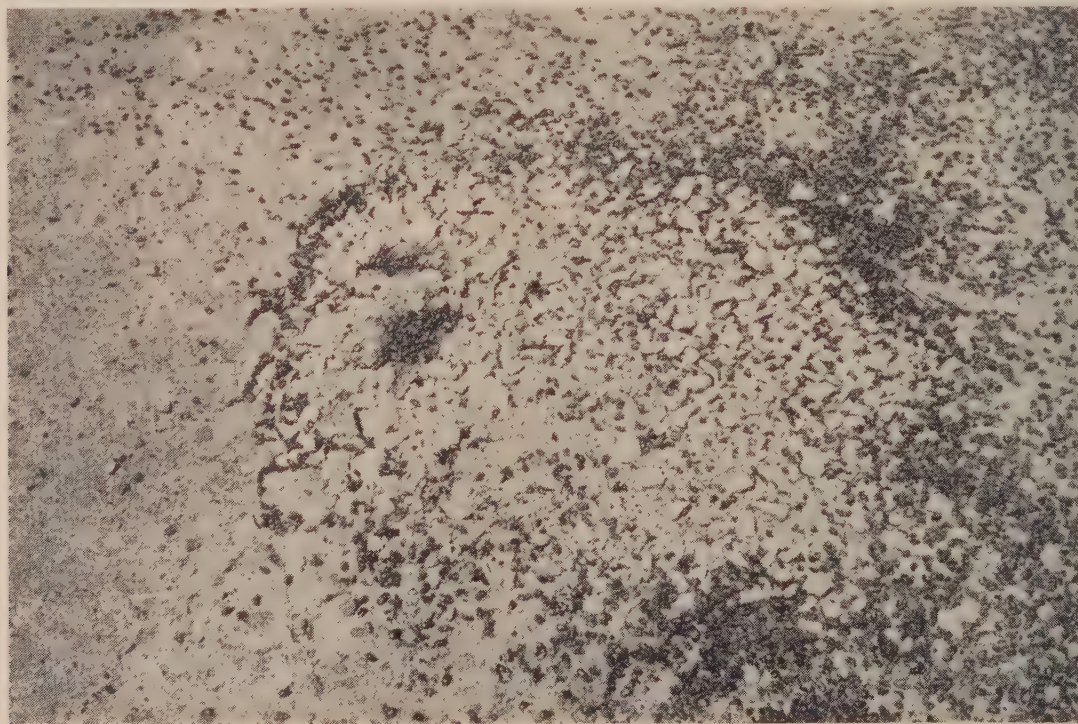
appear in mid-November, and continued to menace irrigated crops and pastures in the Riverina until mid-December. Second generation hatchings occurred in some districts following the widespread January rains. Fliers again appeared in March and caused damage to pastures, lucerne and early sown oat crops. Egg deposition was extensive and heavy in many districts and some third generation hoppers hatched out in late April. Heavy hatchings were reported from the Milparinka district, and flying swarms were noted entering the Canonba area apparently from the direction of Brewarrina.

Though landholders in some earlier districts were slow to take effective action, most Pasture Protection districts became active as the efficiency of recommended control measures became apparent, and good work was done. BHC proved to be the most generally effective insecticide used, though aldrin and toxaphene were also used successfully. Boom sprays, fire-fighters, air-blast machines and, in some cases, aeroplanes and fog machines were used to apply these insecticides. The use of units of the armed services together with a R.A.A.F. Dakota aircraft was a departure.

Wingless Grasshoppers (Phaulacridium vittatum).—These were troublesome, especially in many tableland districts, and damaged pasture as well as crucifers, other vegetables and fruit trees. BHC-bran baiting was found valuable against the vegetable attacks. Toxaphene, chlordane or BHC sprays were used for control on fruit trees.

Other Grasshoppers.—Local grasshoppers extensively damaged pastures on the lower north coast in March and April. The insects responsible were mostly *Heteropternis obscurella*, not previously regarded as economically important, and *Gastrimargus musicus*, the yellow-winged locust. Small numbers of the migratory locust (*Locusta migratoria*) also occurred.

Black Beetle (Heteronychus sanctae-helenae).—This remains one of our most serious insect problems. Plague populations occurred throughout the northern rivers districts, with major damage in the Clarence River area. Large populations also occurred in the Hawkesbury-Nepean basin, and crop damage was reported from many centres throughout the central coast and County of Cumberland. Kangaroo Valley experienced its worst beetle infestation in ten years, whilst considerable damage was reported in several other south coast localities. The beetle plagues followed the usual pattern of high larval survival in the absence of flooding rains during the October-January period. The beetles were undoubtedly an important factor in the State's phenomenally low maize yield. Injury to other field crops, to vegetables, flowers and young fruit trees, and to bowling greens and golf lawns was widespread, whilst pasture damage, especially to paspalum, was extensive on low-lying river flats. The beetles swarmed frequently in spring and autumn, and huge masses of beetles around street lights



(Photo. from Kempsey office.)

Black beetle (*Heteronychus sanctae-helenae*) swarms, attracted to lights in a coastal town, even burrowed into bitumen sealed and metalled road shoulders. Experiments for improved control of this most serious pest of coastal crops and pastures are proceeding.

and neon signs were a feature in many coastal towns. In one instance, such beetle swarms penetrated the bitumen sealing in a main street. Recommended measures such as prebaiting with BHC cracked corn or jetting with DDT or BHC were effectively used, especially in vegetable crops, whilst BHC jetting gave complete protection of maize in an experiment where other plants not so treated were wiped out. Promising results were obtained with dieldrin in bowling greens. Indications of satisfactory control were also obtained with dieldrin in maize plantings.

Army Worms and Cutworms.—Cutworm infestation of cereal crops and irrigated pastures occurred in early spring in the Barham district, and some 300 acres were effectively aerial-sprayed with DDT. A severe cutworm outbreak occurred following the February cyclone on mid-Richmond and Tweed. Damage was extensive on flooded river flats. Pasture plants appearing through the flood debris were quickly eaten off. Resowing of winter fodder crops and pastures was often necessary. BHC-bran baits were used successfully by growers. Spraying or dusting with DDT was also effective. Army worms (*Pseudaletia australis*) and the brown cutworm (*Euxoa radians*) were predominant.

Potato Moth (*Gnorimoschema operculella*).—Conditions early in the season did not favour heavy infestation but the drier autumn months encouraged tuber attack. Losses in unsprayed crops are expected to average about 25 per cent. compared with 2-3 per cent. in sprayed crops.

Pasture Cockchafer (*Aphodius howitti*).—Improved pastures were damaged in many southern localities. Lindane or BHC were applied to control the cockchafers. An unidentified scarab larva damaged native pasture at Moss Vale, whilst larvae of a *Rhopaea* sp. attacked paspalum pasture at Comboyne and Dorrigo.

Heliothis Caterpillar (*Heliothis armigera*).—Maize crops on the north coast were damaged in December and January. Sweet corn at Tumut suffered attack in the autumn. Pea crops were damaged on the north coast in the autumn, and in the M.I.A. in the spring. In the M.I.A. aerial dusting with DDT was effective. *Heliothis* larvae attacked the fruits of Bathurst Burr at Werri Creek and were also reported eating the galls on Crofton weed caused by the recently introduced Crofton weed fly.

Red-legged Earth Mite (*Halotydeus destructor* and *Pentaleus major*).—Widespread infestation of young lucerne and pasture stands by *H. destructor* occurred in southern districts, whilst similar infestations by *P. major* occurred in some north western areas.

Pasture Ant (*Aphaenogaster pythia*).—Following the summer rains on the north coast these ants caused severe damage by tunnelling around the roots of pasture plants and covering the sward with mounds of soil.

Small Brown Weevil (*Mandalotus* sp.).—A wheat crop at Delunga was extensively damaged by these weevils which chewed pieces out of the leaf blades.

Cabbage White Butterfly (*Pieris rapae*).—Infestations were generally lighter than usual in the late summer but infestation increased in the autumn.

French Bean Fly (*Agromyza phaseoli*).—This pest was extremely active in the autumn in north and central coast bean crops, and extended inland as far as Gunnedah and Coonamble. Rapid growing conditions and high bean fly populations made control more than usually difficult.

Grey Cabbage Aphid (*Brevicoryne brassicae*).—Cruciferous crops were more heavily infested than usual during the late winter, and most near-metropolitan crops were treated several times with nicotine or organic phosphate sprays. Trial applications of systox to heavily infested cauliflowers demonstrated almost complete control.

Lettuce Aphid (*Macrosiphum* sp.). Lettuce in the near-metropolitan area and Murrumbidgee Irrigation Areas were heavily infested during the late winter by green aphids. The lettuce heads were rendered unfit for market.

Bean Aphid (*Aphis craccivora*).—Winged swarms of aphids infested young bean plants in many coastal areas in September. These are thought to have migrated from north-western inland areas where heavy infestation on native medics was reported associated with photosensitization of sheep.

Crofton Weed Stem Gall Fly (*Procecidochares utilis*).—Official releases of flies obtained from the Biological Section of the Queensland Department of Lands were made in December at eleven sites in the Shires of Tweed, Byron, Terania, Tintenbar and Kyogle. Successful establishment of the fly resulted and in most cases very satisfactory spread occurred rapidly.

FRUIT PESTS.

Queensland Fruit Fly (*Dacus Tryoni*).—Infestation by fruit fly was not heavy during the early part of the season but increased greatly from February onward. All types of available fruits, including summer lemons and second crop citrus and late-hanging Valencias, were then infested. Very heavy infestation showed up in some inland areas and late Valencias at Bourke were heavily infested in March. Passion fruits showed heavy autumn stinging. Standard splash-bait applications of tartar emetic and sugar continued to give satisfactory control where stinging activity was low but the addition of parathion either to the splash-bait or to the DDT cover sprays was an improvement where stinging was heavy.

Oriental Peach Moth (*Cydia molesta*).—Moth activity was less than in the previous season in the M.I.A. and infestation commenced later in the new year. Infestations in mid- to late-season peaches ranged from 5-30 per cent. where no DDT sprays were applied.

Light Brown Apple Moth (*Tortrix postvittana*).—This pest generally caused little damage in pome and stone fruits or vines, but infestations built up in late summer at Locksley on the central tableland. Great damage was done there in some apple blocks where DDT spray had been used throughout the season and no lead arsenate had been applied.

Woolly Aphid (*Eriosoma lanigera*).—Very satisfactory control of woolly aphid was obtained in most instances where BHC sprays were applied at "greentip" at the recommended concentrations.

Banana Beetle Borer (*Cosmopolites sordidus*).—Following the February cyclone damage to stools, the beetle borer increased tremendously and cutting up of damaged stools became an urgent necessity. The problem of planting new areas with borer-infested planting material remains. Trials indicated that although dipping methods will not destroy larvae and adults embedded in the corm tissue, a satisfactory and safe method for utilizing methyl bromide as a fumigant would provide an answer.

Banana Rust Thrips (*Sciototrips signipennis*).—Progressive thrips numbers occurred from October onwards and in January-February were increasingly high on the Tweed, with a decline in April. Only about 10 per cent. of the total banana acreage was treated for thrips control and a considerable quantity of thrips-rusted fruit reached the market. It showed a reduced return of up to 30s. per case. Experimental applications of DDT or dieldrin gave almost complete protection of fruit in a severe rust thrips season.

Red Spider (*Tetranychus urticae*).—Red Spider built up heavily during the dry spring and summer and considerably damaged banana plantations and bean crops. The infestations declined remarkably through the coastal area after hot humid conditions developed in February. In inland areas spider populations on fruit trees showed a marked increase after higher than usual December-January temperatures. Newer insecticides tested against red spider included PCPBS, PCPPBS, malathion, parathion, chloracide and aramite. The latter two provided particularly good control on apples. The systemic insecticide systox gave excellent control on a number of different plants.

Codling Moth (*Cydia pomonella*).—Spray schedules including DDT again gave highly satisfactory control. Their effect in causing an increase in red spider and their lack of control of light brown apple moth are disadvantages that may be surmounted eventually by including appropriate miticides and perhaps DDT.

Fruit Tree Borer (*Cryptophaga unipunctata*).—Caused widespread damage to President plums at Orange and is becoming more important each year in old plum orchards.

Bryobia Mite (*Bryobia praetiosa*).—This mite heavily damaged apples in some areas where no dormant oils were applied and where TMDT fungicide programmes took the place of the standard sulphur sprays.

Citrus Red Scale (*Aonidiella aurantii*).—Red scale infestations were much lighter than during the previous season and control measures were generally reported to be more satisfactory. Experimental trials and grower experience have not shown parathion sprays to be more satisfactory than established materials for red scale control, though more promising results are being obtained with this material at concentrations around 0.1 per cent. active ingredient. Malathion, which is a safer material, has given interesting results at double this concentration.

White Wax Scale (*Ceroplastes destructor*).—High temperatures in mid-December caused about 75 per cent. mortality in young wax scales on the leaves of citrus trees, but untreated orchards later developed considerable infestations. Very good control was again demonstrated by well-timed and thorough white oil sprays. Parathion sprays, applied when the larvae were well out on the leaves, also gave an excellent kill. Neither parathion nor malathion was of any value at any other period.

Spined Citrus Bug (Biprorulus vibax).—These insects were more prevalent than usual in coastal districts and at Narromine. They caused a heavy fall of lemons and mandarins. Sprays of E605 or lindane gave good control of all bug stages.

Citrus Gall Wasp (Eurytoma fellis).—This pest is now known to occur at Mascot and in the western suburbs at Concord and Strathfield, as well as on the northern side of the harbour. Very good results followed a careful control campaign of cutting out and burning infested material in some suburban areas last winter.

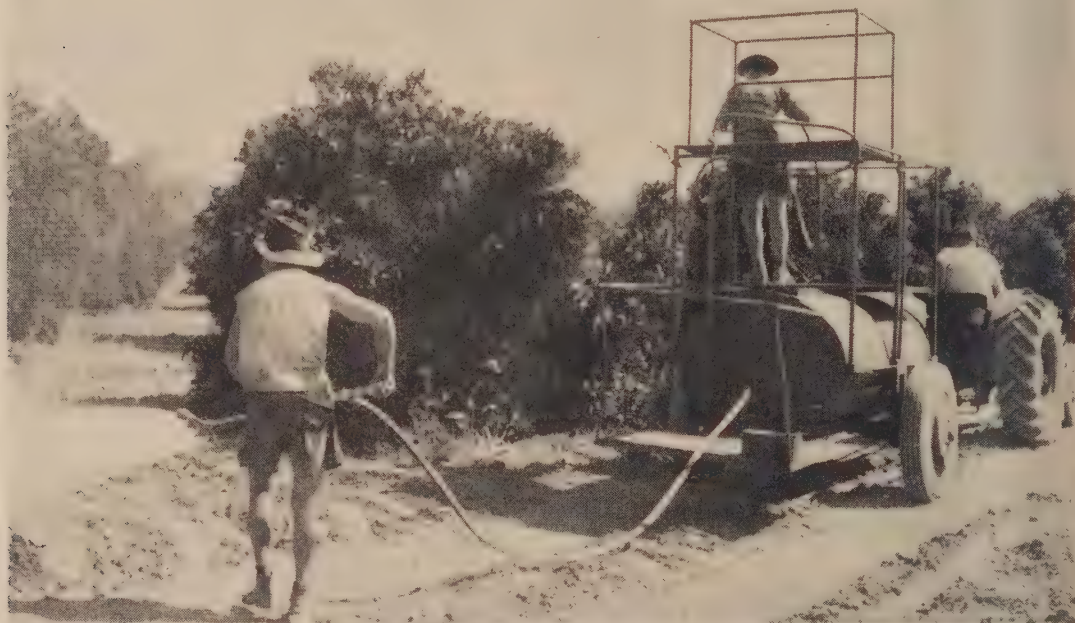
Paper Nest Wasps (Polistes sp.).—Considerable trouble and annoyance was caused to orange pickers at Bourke and Narromine by large numbers of wasps which nest in the trees and sting painfully when disturbed. The occupational hazard so presented deterred fruit-picking gangs from accepting jobs. BHC dust was shown to be a satisfactory material for control.

by several firms. Sheep blowflies were not particularly active, except for brief waves on the southern fringe of the Liverpool Plains, but there was sufficient activity to indicate that dieldrin is the best sheep blowfly specific yet devised. Aldrin is also showing distinct promise.

Preliminary work with a stabilised pyrethrin formulation also gave results sufficiently promising to justify further investigations.

An experiment commenced early in 1953 to determine the effect on wool of treating sheep with synthetic insecticides was completed. It was found that jetting with DDT, toxaphene, BHC and dieldrin caused no significant reduction in the value of the wool.

Laboratory trials of dieldrin effects upon adults and immature stages of *Lucilia cuprina* have been commenced to determine whether a resistant strain of blowflies can be developed.



(Division of Horticulture Photo.)

The tower facilitated the spray brooming of tops of citrus trees at Narromine for red scale (*Aonidiella aurantii*) control. Extension and regulatory officers conducted red scale control campaigns.

White Louse Scale (Unaspis citri).—Very heavy infestations developed in Hawkesbury River orchards last spring. They were preyed upon by a predaceous caterpillar (*Batrachedra* sp.). Trials with parathion or dispersible or colloidal sulphurs at high dosage in combination with petal-fall Bordeaux mixture applications are promising.

Flat Mite (Tenuipalpus californicus).—A very severe scabby injury to Imperial mandarins in western orchards was associated with this mite. Coastal lemons show a typical silvering when injured by this same species.

VETERINARY AND MEDICAL PESTS.

Queensland Cattle Tick (Boophilus microplus).—Field evidence indicates that arsenic-resistant ticks are probably established in several isolated areas on the Tweed, and may lead to the charging of dips with DDT (Rucide). The area of country infested with resistant ticks in the Kyogle division was increased, to include a number of additional properties where arsenical dipping failed to give adequate control of ticks.

It was announced in April, 1954, that a cattle tick eradication programme would commence in January, 1956, in the Kyogle and west of the Richmond Range areas. Since the decision has been made to dip cattle in a medicament other than arsenic, considerable attention has been given, in collaboration with the Division of Animal Industry and the Chemist's Branch, to the selection of the most suitable synthetic insecticide for the programme. A decision has not been reached. Some investigational work may be required.

Sheep Blowfly (Lucilia cuprina).—Dieldrin, which gives two to three times the protection afforded by DDT and BHC against fly strike of sheep, was made available to graziers

Sheep Lice (Damalinia ovis).—Small-scale dipping and fogging tests with aldrin, dieldrin, toxaphene and BHC were conducted on Tamworth Agricultural Research Station. Further observations were also made on lice survival on untreated sheep held on the station throughout the year.

Mites in Dwellings.—Inquiries were again received concerning a method of controlling mites in homes and flats in Sydney. Good results were obtained with BHC smoke generators.

Fleas.—There was a marked reduction in inquiries concerning flea control. It is considered that the relatively dry summer was largely responsible for this position.

Scrub Ticks (Ixodes holocyclus).—Mature and immature parasitic stages caused inconvenience to dwellers in metropolitan and coastal areas. Experience was gained in keeping host animals, bandicoots, in captivity in preparation for work with repellants and for behaviour studies.

NEW RECORDS OF INSECT PESTS.

The weevil *Polyphrades inconspicuus* Blkb., which attacked wheat at Inverell in September, 1949, was identified by Sir Guy Marshall.

COLLECTION.

The following groups have been identified by specialists and are in process of arrangement: *Bostrychidae*, *Scolytidae*, *Dynastinae*, *Tipulidae* and certain *Chalcidoidea*. Submission of material to taxonomy specialists has resulted in the publication of descriptions of two new species of bug; descriptions of a new bee and a new genus of *Ichneumon* await publication.

GRANT TO TAXONOMIST.

A grant of £100 (N.Z.) has been obtained to assist Mr. A. W. Parrott, of Nelson, New Zealand, who is working on the taxonomy of Australian *Braconidae* and *Ichneumonidae*, which are well represented in the Departmental collection.

Chemist's Branch.

CEREAL SECTION.

Wheat Quality Problems, 1953-54 Harvest.—Interest was focussed on the probable quality of the crop, particularly since the demand for export flour had fallen off and the local market had become more selective in respect of flour quality. Early conditions were very dry, but adequate rains occurred late in the growing period. When the harvest commenced, it became apparent that seasonal conditions had induced a significant change in the normal quality variation throughout the wheat districts.

From the eastern portion of the central wheat-growing areas, which usually produce some of the State's lowest quality wheat, significantly higher quality wheat was delivered to the Government Grain Elevators. This gave a more even distribution of the better quality wheat throughout the State, and reduced the wheat quality problems of the mills in that area. Wheat from the southern areas, however, was of relatively low quality, and mills situated in those districts faced the same problems as in the previous year.

The general quality of the State's wheat was higher than that of the previous season, as indicated by the protein content of the official bulk F.A.Q. sample, which was 10.9 per cent. for the 1953-54 crop compared with 9.8 per cent. for the 1952-53 crop.

Another feature of the season was the relatively large amount of premium wheat available to local millers. A total of 5,223,180 bushels was purchased by local millers at a premium above the F.A.Q. price, approximately double the quantity so purchased from the previous harvest. The premiums ranged from 2d. to 3s. 1d. per bushel compared with 2d. to 2s. 7d. in the previous year. The average premium was 1s. 4d. per bushel, compared with the 1952-53 premium of 10d.

However, although premium wheat was freely available, mills in districts removed from the premium wheat areas still had the problem of freight charges, rendering it uneconomical to haul premium wheat long distances, and many enquiries were received from southern areas relative to local wheats for blending purposes.

Cereal Control Work.—702 flour samples were examined for provision of export flour certificates, a 40 per cent. increase on the number so examined during 1952-53. The increase reflected export flour demands although the exported tonnage of flour did not reach the figure of some previous years. The samples were evenly distributed through the year. When mills were working on wheat from the 1952-53 season, many of the samples submitted did not reach the accepted export standard. Mills supplying such flour were assisted to improve the general quality of their output. Even so, some mills were unable to supply flour of the desired standard, and the general standard of export flour was not raised to a satisfactory level until the 1953-54 wheat became available. The export flour market is now highly competitive. The general standard of exported flour must be maintained at a high level to hold and develop markets.

Late in 1953, the Department of the Navy expressed difficulty in purchasing flour of satisfactory quality, for home stations and for shipment for the Royal Navy. Discussions with representatives of the Royal Edward Victualling Yard resulted in the Department of the Navy modifying their purchase methods, to require suppliers to conform to certain minimum requirements. Flour intended for the Navy is now examined to determine whether it complies. Twenty consignments were examined during the year. A considerable overall improvement in supplies has been effected.

Cereal Instruction and Advisory Work.—Wheat growers are taking an increasing interest in the relationship of wheat quality to demand for the grain. Some evidence of the interest in the relationship of wheat quality to soil fertility is provided by the extension of areas laid down to improved pastures in wheat-growing areas.

New England University College conducted a series of schools for farmers in the north and north-western portion of the State, and these schools became increasingly popular with farmers. One such school at Narrabri was attended by some two hundred farmers, and the organisers were specially requested to include in the course the technical aspect of wheat quality. A lecture on *Some Aspects of Wheat Quality* delivered at the school, was subsequently broadcast over northern regional stations. Addresses were also delivered to meetings of farmers' organisations and, where possible, the addresses were accompanied by demonstrations in the field. Chemist's Branch officers provided those sessions.

Further evidence of farmers' increased interest in wheat quality problems is the extension of the practice of awarding points for quality in the wheat classes at country shows. An officer of the Chemist's Branch acted as judge of wheat at Narrabri Show. The judging system was similar to that adopted at the Sydney Royal Show. Two officers of the Chemist's Branch acted as judges and one as steward in the

competitive wheat classes at the Sydney Royal Show. The entries again attracted considerable attention, indicating that shows are still a valuable avenue for extension work.

Information relative to the general quality of the season's wheat, and to quality variations in the different wheat-growing areas was supplied to flour milling organisations.

Mill Room Operations.—931 wheat samples were received for examination in the Mill Room, and 801 were milled:—121 from plant breeders, 222 from Experiment Farms, 39 from Farmers' Plots, 217 from Silos, 107 from R.A.S. activities, and 95 miscellaneous.

Eight hundred and fifty-nine wheat bushel weight determinations were done; and 915 moisture determinations comprised 860 for wheat and fifty-five for maize.

Liaison between mill room operations and the flour millers, bakers, farmers and the general public has been constant. Advice on the use of cereal apparatus has been given to various interests. Important discussions have taken place with a large firm interested in spaghetti manufacture. Schools and pupils have availed themselves of information and wheat samples. Important work has been done for the Glenfield Research Laboratory. A Southern Region flour mill was visited by request, and on the advice given the firm is now spending considerable money to improve their plant and laboratory. Millers have constantly enquired in our Mill Room regarding quality and use of wheat varieties.

The use of detergents for conditioning wheat has been investigated. The results are now being used in this laboratory. Further research on the subject will be carried out. It could importantly influence milling results.

DAIRY CHEMISTRY.

Butter Analyses.—Moisture and salt determinations were carried out on butter samples submitted in connection with the Royal Show and the Factory Managers' Conference.

Factory Advisory Work.—As in the previous year, lack of staff and space has limited the advisory service for dairy produce factories.

Testing of Dairy Glassware.—13,426 pieces of dairy glassware comprising Babcock milk and cream test bottles, milk and cream pipettes, and thermometers, were tested in accordance with the requirements of the Dairy Industry Act. The number constituted an all-time record, and was 2,007 higher than the 1952-53 figure, an increase of the order of 17 per cent.

Rejects fluctuated in the various classes. Cream flask rejects increased from the 0.8 per cent. of 1952-53 to 1.0 per cent. this year, with faults in volume the main reason for rejections. Milk flask rejects increased from 6.1 per cent. of total consignments in 1952-53 to 7.6 per cent., with volume errors the main cause for rejects. The quality of thermometers further deteriorated to the extent of 20.4 per cent. rejects as compared with 19.3 per cent. the previous year. Broken columns were the main cause of thermometer rejects. Milk and cream pipette rejects also increased to 2.2 per cent., from 1.1 per cent. in 1952-53, faulty orifices being largely responsible.

A coding system originated by the Chemist's Branch, tabulating specific faults in dairy glassware, has facilitated efficient records and also the provision of constructive, accurate advice to dairy glassware manufacturers and distributors.

WATERS SECTION.

General Water Analysis.—A total of 1,011 water samples was received for analysis as to suitability for agricultural purposes; 458 from the Water Conservation and Irrigation Commission. The total has risen sharply, from the 745 of the previous year.

Selection of Sites for Public Watering Places.—The Senior Chemist visited the Western Division with the Supervisor of Public Watering Places, in connection with watering facilities on the important Wilcannia-White Cliffs stock route. Sites for two new bores were marked at points 16.1 and 31.0 miles from Wilcannia, after examining geological, chemical and utility aspects. The district is outside the main Artesian basins.

Occurrence of Fluoride in N.S.W. Waters.—Approximately 400 samples submitted by the W.C. & I.C. were analysed for fluoride concentration.

Alleged Pollution of Black Creek by Mine Waters.—With Crown Law and W.C. & I.C. officers the Senior Chemist gave evidence at Newcastle in the case W.C. & I.C. v. Caledonian Collieries. The Commission's information was dismissed. The experience stressed the critical importance of labelling and custody of samples involved in legal proceedings.

Coastal Rivers.—Samples from the Clarence, Hastings, Namubucca, and Richmond Rivers were analysed for the W.C. & I.C.

Demineralisation of Saline Waters.—Further overseas literature was received, including a booklet "Demineralisation of Saline Waters" from the United States Department of the Interior. Personal enquiries were made in United Kingdom Government Departments by the Senior Chemist while visiting London on leave.

Warrell Creek.—A series of samples was analysed for the W.C. & I.C. in connection with the proposed Warrell Creek Improvement district.

Unauthorised Levee Bank on Hunter River.—A series of samples was analysed for the Water Rights Section of the W.C. & I.C. in connection with an unauthorised levee bank on the Hunter River.

Miscellaneous Enquiries.—Enquiries relating to farm water supplies were numerous. The most frequent were concerned with control of algae and the cleaning of muddy water.

MINOR ELEMENT AND PLANT NUTRITION SECTION.

Plant Analysis.—As far as possible, analyses of plants for the elements taken up from the soil are done in respect of plant material submitted for analysis or collected by officers of the Chemist's Branch. Difficulties have been encountered but offset by the many useful results. Examples of some of these results are interesting. Manganese deficiency has been clearly demonstrated on red clover and citrus in the M.I.A. The residual effect of borax on basaltic soils of the northern tablelands was verified; so, too, was molybdenum deficiency in a north coast crop of lettuce. In leaves from an apple orchard in the Penrose district the levels of many elements were within deficiency limits. Suggestions were made to the orchardist in respect of the latter analyses, and following applications of the recommended fertilisers the orchardist claims a marked improvement in the orchard's vigour and production. Field trials have been carried out in conjunction, and the work is still in progress.

New methods used in these determinations are attracting attention.

Salt Analysis.—The Chemist's Branch is co-operating with M.I.A. officers in analyses of plant material suspected of salt toxicity effects. The samples are analysed immediately on receipt, in order to supply the results to the extension officers and finally to the farmers without any delay. The M.I.A. workers suspect salt toxicity on most unthrifty trees and plants not showing recognisable symptoms of any other nutritional disorder or disease condition. Until a report on the salt status of the plants or soil is available, the officers prefer not to look for other answers.

The M.I.A. officers have constantly appreciated this service in their extension work.

Field Trials.—Chemist's Branch association with field trials has extended, mostly with field officers of the Division of Plant Industry. This field activity is facilitating the compilation of a list or pattern of the State's nutritional disorders which is indispensable for advisory work. The advice of Chemist's Branch officers is now continually sought on problems relating to plant nutrition. The field trials have significantly added to the Chemists' understanding and approach to the farmers' problems.

Samples from the controlled plots are analysed with the end view of accumulating as much data as possible on the status of the major elements, phosphorus, nitrogen, potash, calcium, magnesium and sulphur, and the minor elements copper, boron, manganese, zinc, iron and molybdenum in plant material. The relationship of these elements to one another in plant material may provide answers to many of our problem areas. As information accumulates regarding the concentration of these elements in plants, more definite explanations of the isolated failure of plants will be supplied. Already recommendations based on plant analysis are proving most reliable.

Quality of Lime.—In view of the many requests for analysis of lime and dolomite samples, attention is now being paid to the use of quicker methods. Analyses by the standard methods, at times supplemented by spectrographic analyses, consume too much of the time and attention of at least one worker. Attention is now being given to the versenate methods for calcium and magnesium estimations, to replace the long but classical methods of the past. Provided the versenate methods are reproducible, the Chemist's Branch will be able to advise consumers quickly regarding the quality of the products on the market. The citrus industry has continually expressed concern at the standard of magnesium products available and is constantly seeking guidance. The Chemist's Branch has enquired into alternative sources of magnesium to relieve that situation. Assuming a sufficient demand, several prospective producers have indicated that they will supply such materials as magnesite, almost pure magnesium carbonate, to help meet the orchardists' demands.

Sampling of "Anderson type" Trials.—A joint project by the Chemist's Branch, Division of Plant Industry and the C.S.I.R.O. is being planned, to follow up the farming communities' intense interest in plant nutrition trials. Arrangements are being made to select the best trials established throughout the State, prepared either by Departmental officers or the farmers themselves, on the pattern planned by A. J. Anderson of the C.S.I.R.O.

Cuts to measure dry weights are to be taken and some samples are to be retained for plant analysis.

Lectures and Extension Literature.—Lectures on trace elements have been given to Agricultural Bureau conferences and branch meetings and at field days. Several broadcasts have been made. A joint publication with the Division of Plant Industry, for Departmental use, was prepared on the subject of "Major and Minor Elements". Further publications are being prepared.

SOIL SURVEY UNIT.

The Soil Survey Unit now numbers ten officers. Throughout the four years of its existence the Unit has been working in accordance with projects and priorities determined by the Soil Survey Advisory Committee, in which the C.S.I.R.O.,

The Soil Survey Unit's sampling pit in red brown earth on Warrawidgee Estate, about 20 miles west of Griffith, showed strongly structured clay pan underlying weakly structured surface soil.

A Stage III survey of 17,000 acres comprising Warrawidgee II and two smaller estates nearby was completed in September, 1953.

(Chemist's Branch Photo.)



Water Conservation and Irrigation Commission and N.S.W. Department of Agriculture are represented. War Service Land Settlement and Irrigation Commission survey work have had highest priority. Although this has led to a preponderance of work on irrigation area soils, substantial survey and analytical work directly bearing on Department of Agriculture activities has been completed. The following Soil Surveys were carried out this year:—

WAR SERVICE LAND SETTLEMENT SURVEYS.

Warrawidgee II Estate, Griffith.—A Stage III survey of approximately 17,000 acres comprising Warrawidgee II Estate and two smaller areas nearby was completed in September, 1953. The surveyed areas included portions 1, 2, 16-25, part 26, 37-48, 59-64, and 74 in the Parish of Learmouth, portions 53, 59-67, 71, 73-74, T.S. and C.R. 36194, Parish of Bendigo, and Pt. W.R. 2335 and Classification Reserve in the Parish of North Bringagee, all within the County of Sturt, N.S.W. A soil map was prepared and issued for limited use. A report and final map will be prepared and issued on completion of the laboratory examination of soil survey samples.

From this survey, 264 samples were collected representing most of the soils named during field investigations. Total nitrogen, phosphorus and moisture analyses have been carried out. Further work on pH, mechanical analysis, carbonates, total soluble salts and chlorides and exchangeable cations remain to be done. Due to the possibility of its assuming importance under irrigation, examination of the manganese status of some of the soils is anticipated.

Baringa Estate, Berrigan.—A Stage III survey of approximately 950 acres of the Baringa Estate was also completed in September, 1953, including portions 48-49 and parts 45 and 121 of the Parish of Boomanoomana, County of Denison, N.S.W. A soil map has been prepared as a result of the field work and has been issued for use.

Forest Creek Estate, Deniliquin.—A Stage III survey of this estate was carried out during September and October, 1953. Although only 7,000 acres, the estate has a complex soil pattern which may prove important from a pedological viewpoint. A map has been prepared and issued.

In this survey 324 samples were collected for estimation of total soluble salts, chlorides and pH. Two samples, one at the top of the B horizon and one at 42" were collected for each profile. This work will give an accurate picture of the salt status of the soil prior to irrigation. It will also be of value in determining the land use characteristics of soils, particularly in relation to the change of salt status when the soils are irrigated.

Murray Downs Estate.—This survey is in progress. Stage II work has been completed for 56,000 acres, and 25,000 acres of Stage II survey has recently been commenced in areas considered suitable for irrigation.

WATER CONSERVATION AND IRRIGATION COMMISSION SURVEYS.

Billabidgee Soil Survey, Leeton.—This survey is being carried out by the C.S.I.R.O., with a representative of the Soil Survey Unit and a surveyor from the W.C.I.C. in the survey team. At present the survey is at the Stage II level which will cover an area of 750,000 acres. Stage III surveys in selected areas will follow. The complete project will occupy several years.

DRY LAND SURVEYS.

Ku-ring-gai Municipality.—The Municipality of Ku-ring-gai was surveyed during July and August, 1953, at the request of the Commonwealth Experimental Building Station, Ryde. Information on the soil types and their distribution was required for investigations by the Experimental Building Station and the Soil Physics section of the C.S.I.R.O. into the cracking of domestic building walls.

A map was prepared showing the four soil associations mapped in the area, and the seventeen soil series described in the municipality. A report bulletin was prepared and is now with the Government Printer.

County of Cumberland Survey.—Analyses of County of Cumberland soil samples are almost completed, but require still some specialised work in mineralogy. A preliminary report and map have been prepared, and several field trials, and an elementary pot trial, were set out. Results of fertiliser applications on various soil were observed.

In conjunction with the main survey some subsidiary work is proceeding, viz.:—

- (a) *Hawkesbury Agricultural College.*—A detailed soil survey (Stage III) of the 3,500 acres of the College was carried out and mapped. Soil samples were collected for analysis.
- (b) *Somersby Citrus Experiment Station.*—An additional 20 acres of the experimental areas was surveyed in detail. A map was drawn up and issued.
- (c) *Hawkesbury Flood Mitigation.*—Reconnaissance investigations have been made into the salting problem along the Nepean-Hawkesbury River between Rich-

mond and Pitt Town. Soil samples have been collected for analysis. The investigation is being made for the Hawkesbury Flood Mitigation Committee.

Proposed Soil Survey of Wagga Agricultural Research Institute and District.—Preparations for commencement of the field work have advanced. Base maps and geological data have been obtained, and other relevant information is being studied.

ROTATION EXPERIMENTS.

Soil samples from several rotation experiments set out by the Division of Plant Industry were analysed. They included samples from the Maize Rotation Experiment at New England Experiment Farm on which a report has been submitted to the Division of Plant Industry. Salient points from this report include:—(i) Field examinations supported by laboratory analyses show the soils of the experimental area to be reasonably uniform; (ii) statistical analysis of the organic carbon and total nitrogen results show variations between plots but, because of the design of the experiment, these cannot be stated as due to the various treatments; (iii) comparison with total nitrogen results obtained in 1939 indicate that total nitrogen has risen in the clover rotation plots, whilst non-clover rotations appear to be stationary; (iv) sampling be done again at the same point in the rotation cycle in 1960; appreciable differences would not be obtained by earlier sampling; (v) nitrate and ammonia nitrogen analyses through a complete cycle of the rotation would probably be of more value than total nitrogen figures.

SOIL ANALYSES.

A new method for determining carbonate in soils has been investigated and found suitable. The boric acid technique at the distillation stage in total nitrogen estimations has been studied and the advantages and disadvantages noted.

A number of quick test indicators for soil reaction analysis were systematically examined; further work is anticipated.

New methods using versenate compounds have been used for estimation of certain exchangeable cations. Investigations into the use of detergents in soil mineralogy have led to an improved and speedier technique.

Further work has been carried out on analysis of available soil phosphates, using the Williams' fractionation and the Truog extraction.

Volume of Soil Analyses.—Some 4,063 soil analyses were completed during the year, whilst 710 soil samples were ground and bottled. Approximately 1,000 routine analyses were undertaken for home gardeners, agronomists and land holders. In addition, a great number of enquiries by telephone, by correspondence, and by visitors to the Department were answered.

Soil Test Solutions for Agronomists.—In recent months, soil test solutions and a comprehensive set of directions have been prepared by an officer of the Soil Survey Unit for field use by district agronomists.

Soil Preparation.—During the year it was decided that all soil samples from surveys, which were to undergo detailed analyses, should be prepared by hand grinding, passed through a 2 mm. sieve and bottled in the "air-dry" state. The decision that hand-grinding was inescapable was taken reluctantly because it is very time-consuming. The C.S.I.R.O. Soils Division, in Australia, and such overseas bodies as the Division of Soil Survey, United States Department of Agriculture, Macaulay Institute for Soils Research, Aberdeen, and the Cawthron Institute of New Zealand, all have found no satisfactory alternative. Samples required only for certain specific analyses such as total nitrogen and organic carbon may be machine ground.

Accommodation for Soil Workers.—A report based on the findings of a number of authoritative sources has been submitted by the Soil Survey Unit outlining the amount of laboratory space, mapping and special operations facilities and overall requirements of an adequately equipped Soils Laboratory. The report is a working basis for the future, in respect to laboratory accommodation for the Soil Survey Unit.

Lectures.—The Soil Survey Unit was represented at the Banana Growers' Conference at Duranbah and the Vegetable Growers' Conference at Hawkesbury Agricultural College. In each case a lecture on appropriate aspects of Soil Science has been given. During the past two years the Unit has had an officer seconded part-time to the Faculty of Agriculture at Sydney University to lecture to final year students in Soil Science.

New Vehicles.—In November, 1953, the Soil Survey Unit received two specially equipped utility trucks to facilitate the field work.

Walter and Eliza Hall Research Fellow.—Mr. J. D. Colwell, Soil Surveyor of this Branch, is at present working on the fertility status of northern New South Wales krasnozems soils. He is working at the Macaulay Institute of Soil Research, Scotland. His investigations include experiments designed to

elucidate the response of certain crops on these soils to phosphate fertilising, the effect of numerous variable climatic conditions, the iron, aluminium, calcium and phosphate compounds present in the soils and their availability to the growing plant. Another of his plant growth experiments is investigating the residual availability of the phosphate remaining in the soil after experiments carried out last year, and the effect of lime and a mixture of trace elements on this availability. The experiment is also designed to provide information about the value of lime, as a fertiliser and as a means of increasing the availability of fertiliser phosphate in these soils. Mr. Colwell has also been studying the effects of various organic chelation complexes on phosphate sorption, and investigating methods for the determination of "free" iron and aluminium in the high sesquioxide soils under consideration. His results are expected to be of considerable agricultural value to the New South Wales district represented by the soil samples on which he is working.

PESTICIDES.

Arsenic and Lead Residues on Apples.—Samples of apples grown in this State and sprayed with lead arsenate preparations for insect pest control were analysed. Shipments to Brisbane markets were not passed for sale by the local health authorities, because of objectionable residues. Analyses in the Chemist's Branch showed that at least half of the shipments exceeded the tolerances for lead and arsenic residues. Analyses of samples from apples grown on Experiment Farms indicated that if high residues are to be avoided, lead arsenate sprays can only be employed early in the spray programmes.

DDT Residues in Milk.—Milk from cows dipped in DDT preparations for the control of cattle tick has been examined. However, floods in the Far North Coast Region prevented the acquisition of a complete series showing the amount of DDT retained in the milk after dipping. This work will continue in the spring of 1954.

BHC for Grasshopper Control.—Considerable quantities of benzene hexachloride (BHC) in an emulsion form were used as a spray to combat the State's severe plague of locusts. During the campaign the BHC preparations held at various Pastures Protection Board depots were surveyed to ensure that the stocks conformed to the guaranteed gamma isomer content. Other aspects of the matter of stocks were examined, including corrosion, stability of emulsions and storage conditions. Recommendations were made regarding the carry-over and the ordering of new stocks.

BHC for Cattle Tick Control.—In conjunction with the Analyst, Board of Tick Control, an investigation was commenced into the chemical stability of BHC used in dips for the control of cattle ticks. Chromatographic methods for the analysis of the gamma isomer, the active constituent of BHC, were perfected and are being used in the investigation.

Standards Association.—The Chemist's Branch continued to be represented in the committee set up by the Standards Association of Australia to draw up specifications for pesticides. Specifications for chlorate weed killers and copper fungicides were prepared for publication. A start has been made with a DDT specification.

STOCK FOODS AND MEDICINES ACT.

Further batches of stock foods were analysed for conformity with the Act, and in general indicated that the quality of stock foods has improved.

Numerous requests were received from manufacturers concerning laboratory equipment and methods necessary for efficient quality control of their products. As in previous years, the necessity for accurate standardisation of laboratory test solutions was stressed.

FERTILISERS ACT.

Action was taken concerning persons buying supplies of reputable fertilisers registered under the above Act, and selling them in small unlabelled bags.

Samples of fertilisers were also analysed for conformity with the requirements of the Fertilisers Act.

PHYSICAL INSTRUMENTS SECTION.

Increasing demands are being made on the physical instruments located in the Chemist's Branch, to supply urgently required information concerning soil fertility and pesticides in particular.

Recent extensive work by the Branch in the field of plant nutrition has focussed attention on the important part played by the spectrophotograph in determining quantities of both major and trace elements. The data is of inestimable value in assessing deficiency problems, particularly where more than one trace element deficiency are involved.

The increased scope of soil surveys by the Soil Survey Unit is emphasising certain associated analytical requirements, such as in respect of exchangeable bases, for which the spectrophotograph is used.

Incidence of the trace element zinc in plant nutrition investigations has required intensive use of the polarograph.

The Berkham DU Spectrophotometer has been found invaluable in the study of a number of pesticide problems.

Benzene Hexachloride Studies.—Study of the possible use of the polarograph to determine the gamma isomer in benzene hexachloride preparations has been deferred because of the perfection, by staff of the Chemist's Branch, of a chromatographic procedure for estimating this gamma isomer when present in a mixture with other isomers. However, supplementary investigations of the possible use of the polarograph for determining isomers separated from one another by the chromatography technique will be carried out. It appears that the polarograph cannot be satisfactorily applied to mixtures of isomers.

MISCELLANEOUS.

Analyses of Meat Meals.—Batches of meat-meal samples from the Wagga Abattoirs were analysed for protein, fat, moisture and ash content.

Analysis of Wine for Metallic Content.—Samples of wine from the Viticultural Nurseries at Griffith, and from elsewhere were analysed on behalf of the Division of Horticulture for traces of iron and copper. These metals, even though only present as traces, can seriously affect the quality and clarity of wine.

Mould Prevention for Packed Citrus.—Literature, in regard to sodium orthophenyl phenate and hexamine as mould preventatives for packed citrus, was surveyed. The acute and chronic toxicities of these compounds appear to be quite low. Disadvantages in their application to citrus appear to be tainting and the possible incidence of skin dermatitis to the packing-house operatives.

New Guinea Food Supplies.—Advice was sought by an important island trading company concerning kibbled wheat and rice as food for native employees. The company had decided on the use of wheat, and the Chemist's Branch was able to advise on particle size and other considerations.

Processed Wheat for Cleaning Internal Combustion Engines.—It is of particular interest to this Branch that the "processed wheat" for cleaning internal combustion engines is still regularly used by a large corporation engaged in making and conditioning aircraft engines. This was a top secret during the war years and, although it has not been restricted subject matter for many years now, it is not generally known that the Branch assisted the United States Air Force to evolve a product which would completely decarbonise a piston and cylinder with its rings, ports, valves, etc., in ten minutes.

Lately the aforementioned corporation was not satisfied with the quality of "processed wheat" for the purpose and contacted the Chemist's Branch. The trouble was soon rectified.

Recently a firm has imported some portable blasting machines for cleaning internal combustion engines, but the amount of blasting material delivered with the machines was inadequate. The firm has been advised of the source of suitable "processed wheat".

Moisture in Cigarettes.—Moisture determinations on undamaged and allegedly damaged cigarettes have been carried out for the Division of Plant Industry.

COMMITTEES.

The Chief Chemist has been appointed as an assessor for the National Association of Testing Authorities, with respect to the testing and analysis of agricultural products. The Chemist's Branch was represented in the following Committees:

Standards Association of Australia.—(a) Laboratory Glassware Committee, (b) Sub-committee on Babcock Test Apparatus, (c) Sub-committee on Detergents for the Dairy Industry, (d) Chemical Industry Committee, (e) Sectional Committee on Agricultural Insecticides, Fungicides and Pest Destroyers, (f) Determination of Fat in Milk and Milk Products.

A number of standards in the above categories has been finalised, whilst others are in an advanced state of preparation. Development of these standards has been closely linked with recent overseas conferences in similar fields of investigation.

Departmental Committees.—(a) Soil Survey Advisory Committee, (b) Wheat Advisory Committee, (c) Bread Manufacture and Delivery Act Committee of Advice, (d) Plant Nutrition Committee, (e) Pest Destroyers Act Committee, (f) Stock Foods and Medicines Act Committee.



(Chemist's Branch photo.)

The Chemist's Branch Soil Survey Unit, auger sampling soil for analysis, on Warrawidgee Estate II (War Service Land Settlement), near Griffith.

Two hundred and sixty-four samples were taken. Analyses are proceeding. Because of its possible importance under irrigation the manganese status will be examined.

Botanist's Branch.

Botanic Gardens, National Herbarium and Allied Activities.

The National Herbarium, Botanic Gardens, the Domains, Centennial Park, Government House and Admiralty House grounds were maintained in satisfactory condition throughout the year. The usual services were extended to members of the public and to other institutions. Important research work was conducted.

NATIONAL HERBARIUM.

Plant Species new to New South Wales.—Specimens received for identification and report included eight species which were recorded for the first time in New South Wales. Their names, locality of collection, and previous known distribution (in brackets) are as follow:—

- Acacia mucronata*, Cape Howe (Victoria, Tasmania).
- Cenchrus incertus*, Bega (North America).
- Eryngium decaisneanum*, Centennial Park (Brazil).
- Fimbristylis polytrichoides*, Port Stephens (Queensland).
- Lepidosperma effusum* aff., Mt. Dromedary (Western Australia).
- Pultenaea petiolaris*, Coff's Harbour (Queensland).
- Scirpus productus*, Jervis Bay (Victoria, Tasmania).
- Sisymbrium erysimoides*, Deniliquin (Mediterranean Region, and introduced to South Australia).

Records of Rare Species.—The following rarely-recorded species were identified:—

- Acacia verticillata*, *Acomis acoma*, *Galeola foliata*, *Parsonsia leichhardtii*, *Pomaderris argyrophylla*, *Thelymitra chasmogama*, *Thelymitra truncata*.

Naturalised Plants.—Some exotic or introduced plants were recorded as having become naturalised in New South Wales, including the following species:—

- Bidens subalternans*, a native of South America, which is now established as a weed of roadsides and waste lands from Pictou through to Parramatta, Lindfield, Windsor and Kurrajong Heights.

- Eryngium decaisneanum*, which is well established in moist areas in Centennial Park.

- Oxalis bowiei*, a native of South Africa, recorded in the Sydney metropolitan area; *Raphiolepis indica*, a shrub from China and Japan, which is established in Cooper Park, Bellevue Hill.

- Sisymbrium erysimoides*, a plant similar to other naturalised species of *Sisymbrium* and recorded as naturalised in South Australia for some years. It has become established in the Deniliquin district.

Extension of Range.—Careful field observation by members of the staff and other collectors has increased our knowledge of the natural distribution of the species listed below, the previous known range being given in brackets:—

- Alagium villosum* subspecies *polyosmoides*, Allyn River Valley (Hastings River northwards); *Astrotricha floccosa*, Bellevue Hill (Port Jackson northwards); *Banksia integrifolia*, between Yetman and Texas on the north-western slopes (coast and tablelands); *Bassia intricata*, Booliga (west of Darling River); *Caladenia iridescens*, Wentworth Falls and Narrabeen (south of Yass); *Caladenia tessalata*, Wyong (south of Hawkesbury River); *Centrolepis strigosa*, Booti Booti, south of Forster (south of Port Jackson); *Conospermum ericifolium*, Jervis Bay (north of Waterfall); *Daphnandra micrantha*, Minnamurra Falls (north of Hunter River); *Eupomatia laurina*, Springwood (coast districts); *Eucalyptus nitens*, Barrington (far southern tablelands and Ebor, northern tablelands); *Eucalyptus pellita*, between Upper Clarence and Timbara Rivers (Wyong and North Queensland); *Eucalyptus phaeotricha*, northern edge of Dorriggo plateau (Casino to Queensland); *Ficus stenocarpa*, Forster and Port Macquarie (north of Richmond River); *Hakea sericea*, Coff's Harbour (south of Newcastle); *Juncus australis*, Western Plains (Slopes); *Juncus polyanthemus*, Western Plains (western slopes); *Lepyrodia gracilis*, Wentworth Falls (coast); *Peperomia leptostachya*, Minnamurra Falls (north of Port Hacking); *Restio complanatus*, Newnes Junction (coastal districts); *Xanthorrhoea arboorea*, Mt. Coricudgy and Curran's Gap, east of Rylestone (Springwood).

In addition the ground orchid *Pterostylis acuminata*, which is common on the mainland of Australia from Victoria to Queensland, was identified from the highlands of New Guinea.

Botanical Exchanges with other Institutions.—One thousand eight hundred and sixty-three specimens of exotic material forwarded from fifteen overseas institutions were added to the Herbarium. In exchange, the Botanist's Branch sent 5,345 specimens of native plants to thirty overseas and three Australian institutions. The general herbarium collection of native plants has been increased by some 560 specimens.

Field Collections and Seed Exchange.—The seed-and-plant collector made three major trips: to Lidsdale and the Wolgan Valley; Central Tilba and Merrigundah; and Bargo district. He also made a number of short trips in the metropolitan and Blue Mountains areas. About 400 species of native herbs,

shrubs and trees, and also 100 bulk samples of seed were collected in quantity for overseas exchange. From this material and from previous supplies 1,084 sample packets of seed were sent to fifty-one overseas institutions in response to specific requests.

Wild Flower and Native Plants Protection Act, 1927.—In continuation of co-operation with the Department of Local Government in checking the occurrence of protected species on properties for which the owners required sellers' licences, a member of the staff inspected many areas and attended court in connection with a prosecution arising from a breach of the regulations. A number of recommendations concerning this Act was also made to the Local Government Department.

New Species.—Several specimens collected during the year proved to be species previously unknown botanically. One of these has already been described, and descriptions of the others will be made in due course. The plants were recorded as follow:—

Caledonia holmesii, Rupp, Wyong; *Grevillea* sp. Tuross River district; *Lepilacna* sp. Dalgety; *Polystichum* sp. Mt. Mistake, south-east Queensland; *Rupicola* sp. Mt. Coricudgy; *Xanthorrhoea* sp. Curricabah, Barnard River district; *Xanthorrhoea* sp. Hat Head, east of Kempsey.

Poisonous Plants.—The following two species of plants, reported as having caused poisoning of humans, were identified:—

Solanum pseudo-capsicum, "Maderia Winter Cherry", a native of America naturalised in this country for many years. This species caused illness in a boy at St. Marys but the patient later recovered. Deaths have been recorded in South Africa, the fruit being the poison-bearing portion.

Phytolacca octandra, ink weed, a native of America, naturalised in this State for many years. This plant is suspected of having caused severe illness in a woman at Kogarah, who was taking the fruits to relieve a mild arthritic condition.

Important Visitors.—Visiting botanists and other workers who made use of the Herbarium during the year to study material included—Dr. J. H. Beaumont, of the Hawaii Agricultural Experiment Station; Mr. L. D. Pryor, of the Parks and Gardens Branch, Canberra; Dr. R. D. Hoogland, of the U.S.I.R.O., Canberra, en route to the Philippine Islands; Miss Margaret Mackay, of St. Andrews, Scotland, who is investigating the physiology of Australia algae; Dr. I. Cookson, of the Botany School, Melbourne University; and Mrs. B. Allen, official fern collector of the University of California, Smithsonian Institute and British Museum of Natural History.

General.—During the year a supplement to the Index Seminum was issued, containing the names of eighty-two additional species. As a result an increased demand on our seed supplies was made by overseas institutions.

The Australian and New Zealand Association for the Advancement of Science held its biennial meeting at Canberra in January and a number of our botanical staff attended and took part in the deliberations of the general meetings and those of the Systematic Botany Committee.

Selected wild flowers were forwarded to the Pacific National Exhibition at Vancouver and the Adelaide Wildflower Show of the South Australian Royal Society. These cut flowers were all forwarded by air-freight in polythene bags, and reports indicated that the material travelled in first-class condition. An award of merit was issued for an exhibit sent over by this institution to the Pacific National Exhibition.

Further additions have been made to our collection of slides of native flowers in colour. These have been used on a number of occasions by members of the staff when giving lectures to horticultural and other societies, and have also proved to be a most useful aid when replying to public enquiries.

Plant material in eighty-two samples of rumen contents of animals was identified. Portions of many poisonous species were recognised.

Research.—Research work covered a wide range of plant groups. Much of it was directed towards elucidating genera and families prior to the preparation of material on them for the projected publication "Flora of New South Wales." In connection with this project, manuscript has been prepared on the families Azollaceae, Podocarpaceae, Araucariaceae, Pinaceae, Posidoniaceae, Zosteraceae, Potamogetonaceae, Ruppiaceae, Zannichelliaceae, Naiadaceae, Apongetonaceae, Alismataceae, Hydrocharitaceae, Cupressaceae, and on some twenty-seven genera of the Gramineae.

Rearrangement of the Pteridophyte collection in accordance mainly with Christensen's (and partly with Copeland's) scheme of classification has continued. The following families,

sub-families and genera in particular, have been treated, involving in many cases re-allocation of species of the older, broadly conceived genera to their appropriate segregate genera:—

Gymnogrammeoideae, Vittariodeae, Onocleoidae, Blechnoideae, Asplenoideae, Lindsayioideae, Hymenophyllaceae, Plagiogyraceae, Dicksoniaceae, Cyatheaceae, Dennstaedtioidae, Davallioideae, Oleandrideae, Pteridoideae, Dryopteridoideae, Dipteridoideae, Polypodioidae, Elaphoglossidae, Azollales, *Hymenophyllum*, *Dicksonia*, *Nephrolepis*, *Cephalomones*, *Nesopteris*, *Vandenboschia*, *Microsorium*, *Drymoglossum*, *Lemmaphyllum*, *Polystichum*, *Cyathea*, *Lindsaea*, *Antrophyum*, *Pyrrosia*, *Davallia*, *Belvisia*, *Platynerium*, *Polypodium*, *Grammitis*, *Dryopteris* and *Arthropteris*.

Type specimens of certain critical species have been examined.

Descriptions have been prepared for each of twenty ferns collected by the Arnhem Land Expedition.

Fissidens, a genus of Mosses, has been sorted and re-determined in the light of recent work by a Melbourne botanist.

A large collection of New Guinea Ferns, collected by the Rev. Copland King about 1900-1910, which had previously been maintained separately, was incorporated into the general fern collection. The specimens were all redetermined and their nomenclature was brought up to date.

In conjunction with work on the "Flora of New South Wales", exotic material of the genera of the Gramineae treated has been simultaneously reviewed, and, where necessary, species have been referred to appropriate segregate genera. Some of the more important of these genera are:—

Eulalia, *Ischaemum*, *Andropogon*, *Sorghum*, *Hyparrhenia*, *Digitaria*, *Erriochloa*, *Axonopus*, *Brachiaria*, *Urochloa* and *Paspalum*.

Studies have continued on the systematics and distribution of and hybridization in the genus *Eucalyptus*, and considerable field work has thrown light on many of the problems involved.

Field work has also assisted in furthering knowledge on the genus *Juncus*.

The genus *Callitris* has received further critical study leading to a much better understanding of species limits. Nomenclature in this genus has been found to be particularly and unfortunately confused. Photographs of specimens at the British Museum and at Kew, received through the Australian Liaison Officer at Kew, have provided helpful information towards a solution of the nomenclatural difficulties.

Families and genera which have been redetermined and reorganised in the light of recent monographs include the Vitaceae, Anacardiaceae, especially *Euroschinus* and *Rhodospaera*, Meliaceae especially *Dysoxylum* and *Didymocheton*, Celastraceae, *Silene*, *Pavetta*, *Potamogeton*, a section of *Chenopodium* and most genera of the Aizoaceae and Molluginaceae. In the family Celastraceae three new Australian species, belonging to the genera *Celastrus*, *Maytenus* and *Denhamia* respectively, have been segregated.

The species of *Xanthorrhoea* have been revised and a key has been prepared. Some critical work on the Australian species of *Rubus* has revealed the existence of a probable new species and the fact that one common coastal species in New South Wales has been previously misdetermined. Determinations by an overseas specialist on European species of *Rubus* have shown that the common naturalised blackberry in New South Wales is *Rubus vulgaris*, not *R. ulmifolius* as reported last year. Other less commonly occurring species in this State are *R. vestitus* and an American species allied to *R. baileyanus*. Some species of *Acacia*, *Epacris* and *Zieria* have also received critical attention.

Collaboration With Other Botanists.—Considerable benefit has been obtained in the past by sending material on loan for examination and study by specialists in other institutions. In continuation of this policy the following material has been loaned:—The collection of *Malva*; to the National Herbarium, Melbourne; seven specimens of *Marisus* to S. T. Blake, Botanic Museum and Herbarium, Brisbane; the collection of Characeae to the School of Botany, University of Sydney; the collection of *Sargassum* and *Phyllocladus* (Algae) to Mr. Womersley, University of Adelaide; the collection of *Podolepis* to Dr. G. L. Davis, New England University, Armidale; sketches of type specimens of *Psoralea virens* to Miss N. T. Burbidge, Australia Liaison Officer at Kew; the Australian collection of the Primulales to Dr. Spanowsky, Institut und Botanischer Garten, Jena, Germany; material of *Blechnum procerum* to Dr. Schelpe at the Bobus Herbarium, Cape Town; the collection of *Strigula* (a lichen) to Dr. Rolf Santesson, Inst. Syst. Bot., Upsala; the collection of *Australina* to the Botany Department, University of Melbourne; the material of *Arctotis australiensis* and *A. maidenii* to the National Herbarium, Melbourne.

Catalogue of the Plants Grown in the Botanic Gardens.—Loss and misplacement of plant labels during garden operations and, more particularly, as a result of vandalism, together with the constant need to review plant names in the light of current botanical systematic investigations, necessitate continual attention to this field of work. New acquisitions of living plants are not infrequently received under incorrect or obsolete names, so that these as well as all of the older plantings in the Botanic Gardens have required to be checked or redetermined. In the horticultural field this presents particular difficulties; most of the species concerned are exotics, concerning which our facilities for checking are comparatively limited. A great deal of research has therefore been necessary in a wide diversity of plant groups to ensure that the catalogue compiled will attain the highest possible degree of accuracy both as to the identity and nomenclature of the plants.

Publications.—"Contributions from the New South Wales National Herbarium" vol. 2 no. 1 was issued in September, 1953, and contained the following papers:—

"Studies in Australian Pteridophytes, No. 1" by Mary D. Tindale; "A Key to the Genera of Rhodophyceae (Red Algae) Hitherto Recorded from Australia" by Valerie May; "Some Marine Algae from New Caledonia Collected by Mrs. R. Catala" by Valerie May; "A Census of the Native Gramineae of New South Wales" by Joyce W. Vickery.

Other papers published by members of the staff of the National Herbarium were as follows:—

"*Macadamia ternifolia* F. Muell. and a Related New Species" by L. A. S. Johnson, in Proc. Linn. Soc. N.S.W. LXIX (1954) 15-18; "Two New Australian Species of *Polystichum*" by Mary D. Tindale, in South Australian Nat., XXVIII (1954) 31-34.

Papers published during the year by the Honorary Curator, Rev. H. M. R. Rupp, were:—

"Another New *Saccolabium* (Orchidaceae) from North Queensland. *S. subulatum* sp. nov." North Queensland Naturalist, XXI, No. 105 (1953); A note on the Orchid *Saccolabium brevifolium* (F. Muell.), Rupp. Ibid.; "A Beautiful *Dendrobium* from New Guinea". Aust. Orchid Rev. XVIII (1953), 58. "A New Species of *Chiloglottis* (Orchidaceae)". Vict. Nat. LXX (1953), 54-55; "Orchid Notes from North of the Murray". Ibid. (1954) 179-180. Also, in collaboration with Rica Erickson: "The Winter Spider Orchid, a New Species from Wongan Hills". West Aust. Naturalist IV (1953), 64-65.

Papers published in the Agricultural Gazette of New South Wales by members of the Botanic Gardens staff were:—

"Planting Trees Around the Home", by A. E. Wilson, 1953; "Pruning of Garden Shrubs", by A. H. McIndoe, 1953; "Hedges", by A. H. McIndoe, 1954; "Plant Propagation", by A. H. McIndoe, 1953; "Growing Plants in Pots and Tubs", by C. R. G. Grant, 1953; "Bush House and Verandah Plants", by C. R. G. Grant, 1953.

Other numbers of the "Contributions from the New South Wales National Herbarium" at present in press are vol. 2, No. 2, containing a paper entitled "An Enumeration of the Plants of the Albury-Tumbarumba-Holbrook Districts", by E. J. McBarron, and vol. 2, No. 3, containing "A Revision of the Australian Species of *Danthonia*", by Joyce W. Vickery.

Another paper completed and submitted for publication is entitled "Ferns of the Arnhem Land Expedition", by Mary D. Tindale. This is to be published with other botanical papers in vol. 3 of the report of the Commonwealth Government of Australia and National Geographic Society of America Expedition to the Arnhem Land Aboriginal Reserve in 1948. Miss Tindale has also prepared Keys to the Species of *Isoetes* and *Marsilea*, which are to be incorporated in a new edition of the Victorian Naturalists' "Handbook to the Ferns of Victoria and Tasmania".

BOTANIC GARDENS AND DOMAINS.

The Botanic Gardens were maintained at a particularly high level. Some noteworthy improvements were made.

Royal Visit.—On February 3rd Her Majesty Queen Elizabeth II and His Royal Highness the Duke of Edinburgh made their landing on the traditional area in the Domain at Farm Cove. From this point the Royal Progress continued around the sea wall drive through the Botanic Gardens, the areas under our control thus providing the setting for this historic occasion. For many months previously our own staff and that of the Department of Public Works were preparing the appropriate areas. Extensive floral displays were established, special attention was given to lawns, shrubberies and trees, roads and footpaths were repaired, gates, fences and seats were

painted, water services were renewed and other important work was carried out. Three large stands were erected and appropriate decorations provided along the route.

The Gardens were at their best for the occasion, the staff as a whole earning congratulations for the efficient completion of a difficult task. The glasshouse staff was called upon to decorate the dais at the landing place, also Government House and special functions such as the opening of Parliament and the State Banquet.

On 13th February, 1954, Her Majesty and His Royal Highness planted commemorative trees for the Botanic Gardens in special containers at Government House. Subsequently, on 10th March His Excellency, Sir John Northcott, Governor of New South Wales, at the command of Her Majesty, placed these trees in their permanent position in the Palace Gardens.

The two trees were respectively *Ulmus parvifolia*, "Small leaved Elm", planted by Her Majesty, and *Calodendron capense*, "Cape Chestnut", planted by the Duke of Edinburgh.

Improvements.—Among the many improvements during the year were:—

- An area was set aside for medicinal plants and herbs and appropriate beds and paths were constructed.
- Several beds were made to demonstrate wind and spray resistant species, the area selected being near the sea wall at Farm Cove.
- A number of species, mainly not represented in the Botanic Gardens, was added to the conifer, oriental and native collections, apart from general shrubberies.
- An informal group of eucalypts was planted near the Maiden Memorial pavilion.
- Further progress was made with the completion of the new water service, as a result of which a big improvement was observed in watering facilities.
- A stone commemorative seat was erected at the Garden Palace entrance as a surround to the tree planted by Her Majesty.

Glasshouse Displays.—The general collections were well maintained. A special display of glasshouse plants was erected in the centre of the Horticultural Hall at the Sydney Royal Show, and gained a special award.

Landscape Advisory Service.—Increased demands were made and the Landscape Gardener visited many metropolitan and country institutions. He also undertook the preparation of a new plan of the Botanic Gardens. The previous issue was in 1921. The new plan has been of great assistance, enabling exact location to be given for plants listed in the new catalogue of plants grown in the Botanic Gardens.

OUTER DOMAIN.

The various areas were maintained satisfactorily. Heavy demands were made by sporting bodies for the use of the playing fields.

Special attention was given to paths in the south-east section, apart from extensive repairs to Mrs. Macquarie's Road and paths in the vicinity of the landing area for the Royal Visit.

GOVERNMENT HOUSE.

Special attention was given to the grounds of Government House, to assure them being at their best during the Royal Visit. Some difficulty was experienced in arranging the planting programme so that best flowering would occur during this restricted period in late summer. The grounds reached a high standard.

Several azaleas were removed because of attack by the root fungus *Armillaria mellea*. The ground was sterilised and several large azaleas were transplanted to the same site with satisfactory results.

CENTENNIAL PARK.

The area was maintained in satisfactory condition. A number of improvements were effected. Particular attention was given to sections of the main drive, which required extensive repairs.

Several A.B.C. symphony concerts were held in the area.

The main playing areas set aside for various sporting activities were used to capacity.

During the Royal Visit an area was made available for a gathering of some 20,000 school children who welcomed Her Majesty and His Royal Highness under ideal conditions.

Facilities were provided for the Royal Agricultural Society in connection with the Royal Show. Special attention was given to the movement of motor vehicles, especially heavy traffic, with the co-operation of the Police Department.

DIVISION OF MARKETING AND AGRICULTURAL ECONOMICS.

State Marketing Bureau.

Marketing Boards.—The various producer-controlled boards functioning under the Marketing of Primary Products Act, 1927-40, are the Egg, Rice, Potato, Navy Bean, Wine Grapes and French Bean Seed Marketing Boards.

The French Bean Seed Marketing Board was proclaimed this year, following the previous year's poll of growers at which 75 per cent. of the votes favoured the establishment of a Board. Regulations governing the operations and working of this Board were prepared and gazetted early in the year.

Recommendations have been prepared for amendments to the regulations covering the operations of the Potato Marketing Board, in respect of (a) the substitution of weekly for monthly pool periods, and (b) the provision that in the absence of a Board member any two officers of the Board may sign cheques, such accounts to be referred back to the Board for endorsement.

A proclamation was prepared and gazetted vesting rice in the Rice Marketing Board.

Several polls were conducted: In August in respect of the election of producer representatives to the newly constituted French Bean Seed Marketing Board, with an enrolment of 116 producers; in the same months a poll on the question of dissolution of the Potato Marketing Board, the total enrolment of producers in this instance being 4,257; early in 1954 the triennial election of producer representatives to the Wine Grapes Marketing Board, with 316 producers enrolled for the area covered by the Board.

The formation of a Broom Millet Marketing Board was raised. A number of meetings of producers were addressed by the Chief of the Division and the possibility of the formation of such a Board now appears to be remote.

Market Reports and Statistics.—The Division continued to fulfil its statutory obligations in regard to the collection, compilation, publication and broadcasting of market information. Market prices and trends, the availability of supplies, and other relevant information, were covered in respect of the livestock auctions at Homebush (cattle, sheep and pigs), the poultry and fish markets, the Sydney fruit and vegetable and flower markets, Alexandria railway goods yards, Sussex-street, and Homebush Abattoirs.

A report on the grain market, and on stocks of butter, cheese and eggs in cold store, was published weekly.

Cold storage statistics for fruit were published monthly, together with monthly average prices for a wide range of products. The daily collection of retail prices for a large range of foodstuffs, including fruit, vegetables, meat and fish, continued.

The Australian Broadcasting Commission continued its daily national network broadcasts of market information supplied by the Division. The Division provided a similar service to newspapers and journals, through *Daily Market Reports* and the *Weekly Marketing Notes*. The latter publication summarised each week's trading.

The Division has been required in several instances to examine marketing methods, price trends, suitable markets for placement of produce, and in particular to provide information on the optimum period for the marketing of various types of fruit and vegetables. There have been at all times live interest and obvious producer confidence in the Division's market information services.

Records of the movements of primary produce by rail and sea have been maintained, covering both intra-State and inter-State arrivals on the Sydney markets. Unfortunately, satisfactory information on the movement of produce by road has not been achieved.

Crop Reviews and Forecasts.—Surveys were undertaken at selected intervals during the development of the wheat, oat, maize, broom millet, potato, pome and citrus fruit crops. The aims were reports on crop condition and estimates of production, for official use and for the information of the relevant industries and the general public. The crop reviews were based on reports from the Department's district agronomists and fruit officers, and from a large body of *honorary crop correspondents* located in the various producing districts.

The pastoral industry and associated interests were served by a circulated monthly broadsheet, the *Review of Grass Conditions and the Pastoral Outlook in New South Wales*. Honorary correspondents and Inspectors of Stock provided the basic data. The co-operation of forestry officers was maintained in respect of information for the *Quarterly Review of Honey Flow Prospects* which is issued mainly in the interests of itinerant beekeepers.

Meteorological Services.—An officer of the Division continued as Departmental representative on the State Climatological Committee of New South Wales, and he acted in general as liaison officer between the Department and the Sydney Weather Bureau. Meteorological advice and data are provided by him for the use of Departmental officers and the public seeking such information in relation to farming or contemplated farming. The up-to-date extensive meteorological records are in any case essential to the Division's crop review and forecast service. Action also continued in regard to provision of adequate meteorological equipment for the Department's Colleges and Experiment Farms. The preparation of quarterly rainfall graphs for publication in the *Agricultural Gazette* was undertaken as usual.

Economics Research.

A comprehensive programme of field research proceeded. The pattern was very similar to that of 1952-53. Some important research was again undertaken in collaboration with the Commonwealth Bureau of Agricultural Economics. The results of that work have been, or will be, published jointly with the Commonwealth Bureau in the Division's *Review of Marketing and Agricultural Economics*. The Division's research programme was concerned with a wide range of economic problems affecting agriculture as well as detailed problems of farm management.

Survey of Dairying under Inland Irrigation Conditions.—This survey of dairying under inland irrigation conditions, in the Berrigun and Deninein Irrigation Districts, was one of the most important research projects completed during the year. The economic aspects of dairying were investigated on almost every dairy farm of any status in the area. Reasonably good prospects for dairying under the conditions are apparent, but the place of dairying relative to such other land use as fat lamb raising, in future irrigation development, requires further investigation. The research project completed this year is the first phase of an intended wider programme of economic investigation into inland irrigation farming. This work will be of utmost importance in view of the immense irrigation development in New South Wales in the next quarter century.

Analyses of Dairy Grant Demonstration Farm Accounts.—Another survey, completed this year, involved detailed case studies of five dairy farms on which considerable sums have been expended under the Dairy Industry Extension Grant. The case studies comprised analyses of detailed records maintained by the farmers since the outset of the demonstrations, supplemented by a thorough investigation of management practices on the farms.

Some striking results, in financial and production terms, were obtained from the case studies. The cases demonstrated with great force the economic value of improved management practices on coastal dairy farms. The results of the studies have been published in detail, and have already proved most helpful in field extension work. Study of the management of four of these farms will continue, because it is believed in all cases that the full production and financial benefits of the improved managerial practices have not yet been fully reflected.

Survey of the Beef Cattle Industry.—This survey, commenced in the previous financial year, was continued in collaboration with the Commonwealth Bureau of Agricultural Economics. A report on the beef cattle industry in the north-eastern part of New South Wales was published. The survey is continuing in other parts of the State. Detailed information has already been obtained regarding beef cattle raising in the north-western portion of the State and, although some field work still remains in this area, a comprehensive report will be available before the end of 1954.

Survey of North Coast Dairy Farms.—Social and economic conditions on a group of dairy farms on the red soils of the Richmond-Tweed district were the subject of a published report based on an economic survey. The survey was originally designed to obtain detailed information on the effect of differing tenure arrangements on managerial efficiency and farm productivity. Owing to the resignation, early in the year, of the officer primarily responsible for the design and conduct of the survey, analysis of material has been delayed but work is proceeding. A report on tenure arrangements and conditions and their effect on farm efficiency will be available later in 1954.

Survey of the Cost Structure of the Dairying Industry.—In this Australian-wide survey by the Commonwealth Bureau of Agricultural Economics in collaboration with State Departments of Agriculture, industry representatives, and other instrumentalities, the Division played an important collaborative part in the design of the questionnaire, and subsequent field assistance. Some 250 dairy farmers were interviewed in New South Wales and over 1,000 in dairying districts throughout Australia. The Division also assisted the Commonwealth Bureau in the analysis and interpretation of the material obtained and the assessment of butter production costs. As the survey was undertaken primarily to assess, for policy and for price-fixing purposes, the cost of producing

butter, this aspect took priority over a study of managerial factors affecting the efficiency of dairy farming. Now that a cost figure has been obtained, the survey material will be further studied in an attempt to assess the reasons for differences in costs between regions.

Study of the Adoption of Approved Farm Practices by Wheatgrowers.—Another survey initiated this year, and on which field work has been completed, concerned factors affecting farmers' adoption of new and improved farm practices. This study was done in two homogeneous wheat areas of the State. Analysis and interpretation of the survey material had not been completed at 30th June, 1954.

Potentiality and Extension Survey in the Southern Agricultural Region.—The Division has been requested by the Southern Agricultural Regional Committee, to survey in that region the potential for farm development and also the effectiveness of existing extension services. Plans are in hand and a start will be made shortly.

Other Research Projects.—A number of other relatively minor research projects has been undertaken during the year, including:—

Clarence River Gorge Proposals.—At the request of the inter-departmental committee concerned with Clarence River Gorge proposals, the probable effect of two alternative dam levels on the productivity of the area was subject to a further economic assessment.

Producer-Consumer Price Spread.—An investigation of the price spread between producer and consumer for most of the important foodstuffs produced in the State was in progress at the end of the year.

Lower Lachlan Valley.—A descriptive report of the Lower Lachlan Valley was prepared at the request of an inter-departmental committee.

Murrumbidgee Irrigation Areas.—The Division participated in discussions with the Department of National Development, the Commonwealth Bureau of Agricultural Economics, University authorities, and other State instrumentalities, regarding an economic and sociological investigation of the benefits which have been derived from the provision of irrigation water to the Murrumbidgee Irrigation Areas. The Division will undertake, in collaboration with the Bureau, an investigation of the primary economic benefits.

Advisory, Educational, and Extension Services.

General.—The Division continued to serve as a major source of statistical and allied information on New South Wales agriculture, for all sections of the Department, for other Departments and State instrumentalities, for farmers' organisations, commercial firms, the press, and the general public.

Lectures.—Economics Research Officers and markets officers addressed Departmental schools for farmers, and meetings organised by the Agricultural Bureau and other farmers' groups, by professional societies and other organisations. The Division also provided a part-time lecturer in agricultural economics at the Wagga Agricultural College, and continued to examine in this subject at both Wagga and Hawkesbury Agricultural Colleges. The Principal Economics Research Officer again acted as Public Service Board tutor in Agricultural Economics and Farm Business Management for officers preparing for the Public Service Board's Regulation No. 124 examination.

Colombo Plan and U.N. Students.—Extensive opportunities for study and general instruction in agricultural economics, agricultural marketing and related subjects were given to a number of Colombo Plan and United Nations students from Ceylon, India, Indonesia and the Philippines. All the students have been officers of the governments of their respective countries. Their interest, experience, seniority, and range of activities varied widely. Every student has been assisted to the limit of the resources available, in keeping with the potential importance of the Colombo Plan and associated schemes, to the future welfare of Australia.

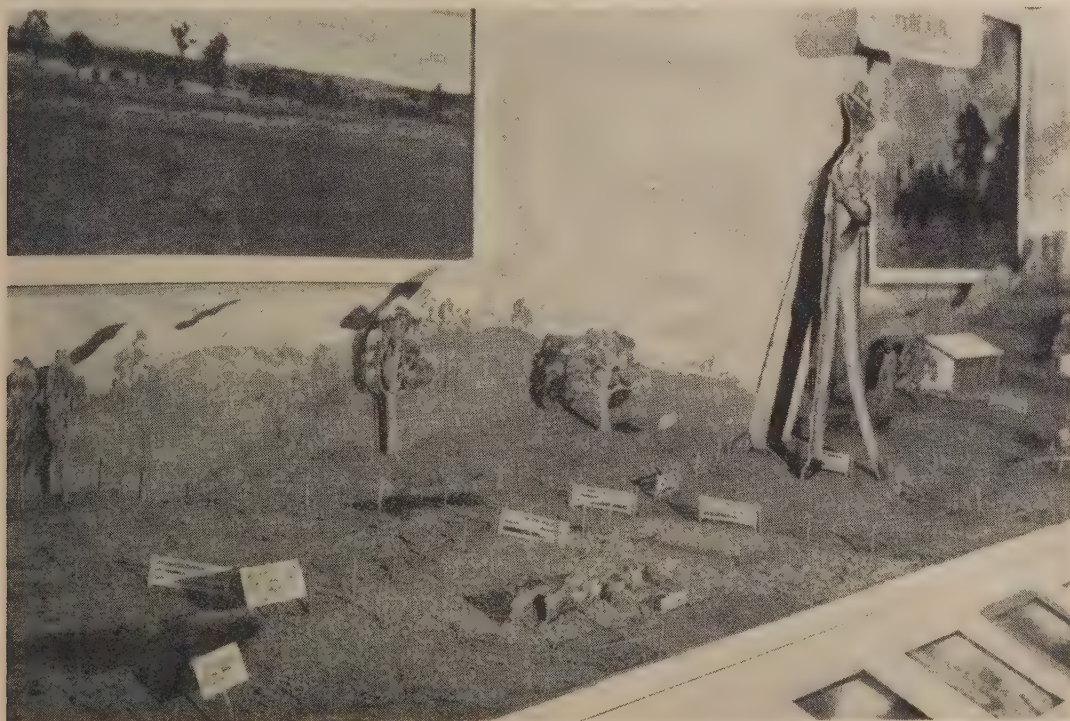
Publications.—Publication of the quarterly *Review of Marketing and Agricultural Economics* continued, but circumstances made it necessary to combine the September and December, 1953, issues. The Review's prestige and circulation continued to increase. It is making notable contributions to the understanding of agricultural economics, farm management and agricultural marketing in this country.

Economics research officers also published regularly in the Department's monthly *Agricultural Gazette* contributions under the popular title of "The Business of Farming", designed specifically for the use of the farming community.

The regular monthly *Report on Production Trends* proved useful in official circles and to the press, commerce, and individuals representing a wide range of interests. Other regular publications, mentioned earlier include the *Weekly Marketing Notes*, the *Review of Grass Conditions* and the *Pastoral Outlook in New South Wales* (monthly), and various crop reviews and forecasts.

A further printing of the booklet *Getting Started in Farming*, slightly revised, was published. It continues to be in demand in Australia and overseas. Arrangements were also made for reprinting of three of the four *Farm Record Books* published by the Division.

Representation at Conferences and on Committees.—The chief of the Division continued as Chairman of a Committee of Enquiry into fish marketing until the enquiries were completed and a report was prepared. He also was a Departmental



The Department's exhibit at the 1954 R.A.S. Show featured "rain harvesting", pasture establishment and irrigation, the merits of paddock subdivision, strip grazing, and conservation of feed.

representative in the State Nutrition Committee, the Irrigation Development and Food Production Advisory Committee, and the Markets Investigation Committee. The Principal Economics Research Officer was again Executive Officer of the State F.A.O. Committee. The Division was also represented in the Markets Advisory Committee.

DIVISION OF INFORMATION AND EXTENSION SERVICES.

Information for the Public.

The Division again encountered striking evidence of the public's interest in the Department's information services. Some 188,322 requests for information (30,320 by phone; 58,738 by letter; 99,294 over the counter) were received and dealt with in this Division. For the greater part they were satisfied by literature selected from the range of 900 titles available. The volume of the publications issued by the Division was 1,500,867 items. Sale publications totalled 6,012 at a value of £842.

Extension Aids for Field Officers of All Divisions.

This Division's long-established role has been to supplement the extension services of field officers of all Divisions by attention to mass and group contact media. In these respects, it produces periodicals, press sheets, and a wide range of miscellaneous literature for the man on the land; it organises group extension media, the branches and councils of the Agricultural Bureau throughout the State, and programmes for rural women; it provides a library circulation service for field officers; it organises extension methods training schools for field officers and leadership training schools for rural people; and so on.

In more recent years it has been able to use funds from the Commonwealth's Agricultural Extension grant and Dairy Industry Extension grant, to secure a comprehensive range of audio-visual extension aids equipment. By far the greater part of this range of equipment is located in field offices—35 mm. cameras and projectors and office-desk slide viewers, 16 mm. sound-on-film projectors, public address systems, tape recorders, etc. Meanwhile, to advance the skills of field officers in educational use of the audio-visual aids, the Division has within its head office framework a "Photographic Aids and Film Section", a "Radio Section", a "Display/Designing Section", charged, *inter alia*, with responsibility for tutorial service to field officers of all Divisions.

In addition, three "Regional Publicity Officers" have been added to the Division's staff. Those officers, respectively stationed at Wagga, Lismore and Orange, are assisting the Regional Agricultural Supervisors to make more effective the field officers' use of "multiple contact" media of extension service—press, radio, films, photography for projection, meetings, field days, demonstrations, etc.

Editing Services.

Agricultural Gazette of New South Wales.—Circulation of this monthly periodical, which is free to farmers, increased from 28,200 to 32,300. Circulation of *Poultry Notes*, a monthly reprint from the *Gazette*, increased to 5,800.

Herd Recorder's Letter.—This bi-monthly pocket book has a circulation of 1,900, to herd-recording dairy farmers and to field officers. The question of extending the circulation to some 16,000, to include all dairy farmers, has been under attention. At the close of the year it seemed probable that a new basis of circulation would be decided shortly.

Weekly Press Sheet.—Circulation of this sheet of topical items for press and radio use increased to 954 per week, including 294 newspaper and radio station addresses. Some 783 topics were subject of notes in the sheet's fifty-two issues. Newspapers borrowed 304 stereos, arising from illustrations in the sheet.

Special Press Releases (Roncos).—Apart from articles released in the weekly *Press Sheet*, 181 roncoed releases were made. They involved not less than 40,043 despatches to newspapers and radio stations.

Pamphlets, Handbooks, Bulletins, etc.—The range of titles increased to 922. Not less than 292 were under editing attention, for revision or improved display or routine treatment prior to reprinting.

Library Services.

The library's important place in the pattern of this country's agricultural research and advisory services has been emphasised by the increasing requests for service, received from universities and other teaching/research institutions throughout Australia.

Accessions totalled 11,239 items in the twelve months. Loan of publications to Departmental officers, mostly by postal despatch to field officers, amounted to 19,021 items. This, unfortunately, was some 4,000 items less than in the previous

year, but the reduction was entirely due to periods when the library had to be closed for certain reconstruction activities or when periodicals' circulation had to cease through shortage of office assistance.

At the close of the year the library had acquired modern photo-copying equipment, which will enable the establishment of a single and multiple copying service that will inevitably enhance the library's influence on field officers' research and extension works.

Display Artists/Designing Service.

The Department's exhibit in the Agricultural Hall at the 1954 Royal Agricultural Society Show was the major undertaking, but designs and materials were prepared also to assist field officers' show exhibits at Wagga, Kempsey, Bega, Mulumbimby, Bombala, Glen Innes and Hawkesbury.

Lecture aids, charts and drawings were executed in response to field officers' demands. Signs for use at field days or in demonstration plots, directional maps to clarify field day itineraries and colour posters, were amongst miscellaneous services rendered to other units of the Department.

The Divisions' editing staff was assisted by the preparation of thirteen cover designs, mostly in colour, and the subsequent art work for printer's reproduction. Some 103 illustrations were executed for the *Agricultural Gazette* and other publications. Numerous photographs were retouched, prior to submission for block-making.

Photographic Aids and Film Services.

16 mm. Cine Film Library.—The film library expanded from 138 to 149 titles. Eleven hundred and thirty-two films, including films borrowed from other libraries and quarterly "block loans" from the New South Wales Film Council, passed through the Division in the collation of programmes for despatch to field officers or branches of the Agricultural Bureau. Two hundred and eighty-three programmes were collated and despatched. The resulting volumes of pre-despatch and post-return checking of film condition, and repair where needed, were heavy on officers from other sections of the Division who volunteer their time to maintain this group extension aid. Four "film circulars" were also prepared and despatched to field officers and borrowing groups, to supplement the Department's *Film Catalogue*, published in 1952.

Assessment Screenings.—Screenings for "assessment parties" of appropriate Departmental officers were arranged on sixteen occasions, to determine whether to purchase a particular film or whether, and under what restrictions, if any, a newly-available film might be included in programmes collated and loaned by the Division. In addition, screenings by the New South Wales Film Users' Association and the Sydney Scientific Films Society were regularly attended by an officer of the Division of Information and Extension Services. On several occasions that attendance saved the need for evaluation screenings within the Department.

16 mm. Cine Film Production.—Three cine films expected shortly to be completed are the outcome of camera work by the Division's Photographic Aids Officer. They are "Herd Improvement" (400 ft. black and white, silent), "Hawkesbury College Vocational Schools for Farmers" (400 ft. kodachrome, sound, from 1,500 ft. acquired), and "Establishing Irrigated Pastures" (kodachrome, sound, to be edited from 1,500 ft. acquired in the Murrumbidgee Irrigation Area and Murray areas, in collaboration with the Murrumbidgee Irrigation Area Agricultural Service).

Near to sufficient footage to complete a film story on the development of "Willigobung Estate" as an orcharding soldier settlement is also on hand.

The Division is collaborating with the C.S.I.R.O. Film Production Unit in a pastures film intended for use in extension service.

35 mm. Photography ("Stills").—At the close of the year there were forty-nine 35 mm. cameras located in field offices, to stimulate field officers' acquisition of shots for use in extension service, and a further nineteen 35 mm. cameras were on order. Comparable numbers of projection equipment, 35 mm. slide and strip projectors, for group contacts, and 35 mm. office-desk slide viewers, were also located at field offices. A number of automatic, rotating slide projectors for use in show exhibits and window displays had also been acquired.

The Photographic Aids Officer has been impressed by the improving standard of field officers' photography, in which respect he has tutorial responsibilities. He reports the critical handling of 2,680 kodachrome transparencies and 6,405 black and white prints or transparencies, all from field officers' cameras during the year. His return of the processed material to field officers is accompanied by tutorial comment appended to each shot that lends itself to such advice.

Radio in Extension Service.

The death of Extension Officer (Radio) Mr. G. A. Saunders, in July, 1953, after a long illness, was a sad loss. The vacant position has been filled, however, by the appointment of Mr. D. Walker, H.D.A., a former A.B.C. Country Hour cadet and former field officer of the Tasmanian Department of Agriculture.

Tape Recorders for Field Officers.—Tape recorders and accessories, operable from a 12-volt battery where 240-volt A.C. is not available on a farm, have been issued to twenty-three field offices of the Department, located in country towns which have a local radio station. They are expected to stimulate field officers' use of farmer "achievement stories", as extension tools, in local farm radio sessions.

The Extension Officer (Radio) has organised itineraries which will, in the approaching months, bring him into contact with each "tape recorder group" of field officers, to develop their use of the recorder and in general their broadcast interview technique.

Officers' Use of Country Radio Station Facilities.—A survey questionnaire to field officers this year revealed, amongst other things, that twenty-five country stations claim to provide at least weekly sessions for the man on the land, and that at least twenty field officers make regular contributions, whilst at least thirty others make frequent but irregular contributions. Many other officers, of course, make irregular, infrequent contributions.

Public Address Systems at Field Offices.—Prior to 1953-54 there were eleven public address systems amongst the district offices. This year another twenty-three have been distributed strategically. This audio aid equipment will make more effective the group contacts of field officers at field days and farmer conferences. The systems operate from a 12-volt battery as well as 240-volt A.C. The Extension Officer (Radio) is coaching field officers in the use of the P.A. equipment.

Agricultural Bureau—Group Extension Service.

Bureau Branch Activities.—There were 211 branches of Agricultural Bureau on the mailing list at the close of the year. The Organiser estimates, indicating their value in group extension service, that the branches between them promoted not less than 300 local field days in the twelve months. In addition, they conducted their monthly meetings, many of which were allocated to lectures, discussions, debates, films. District and inter-district tours, visits to experiment farms, research stations, and soil conservation stations also featured in their extension activity.

State and Divisional Councils' Activities.—Six of the Bureau Divisions (geographic regions) conducted educational conventions for which the respective attendances ranged to 400 men and women, and two conducted Divisional Field Days. One of the latter, at Tamworth, concerned with farm mechanisation, attracted 4,000 people.

The State Council conducted the 29th Annual State Conference at Hawkesbury Agricultural College in July, 1953. Some 300 men and women delegates and visitors, from localities State-wide, were in residence for the three-days' programme of educational sessions.

The Agricultural Bureau Scholarship (£96 p.a.) tenable at Hawkesbury Agricultural College and the State Maize growing Championship trophy for junior farmers were again awarded by the State Council.

Second Beef Breeder Competition.—This competition, again organised in collaboration with the Rural Bank of N.S.W., attracted 181 entries and widespread attention. The many field days held in association with judgments at district and State levels assured the success of the competition as an extension tool.

Women's Extension Service.

A still increasing volume of correspondence from rural women, individuals and organisations, dealing with farm home and family matters, was handled by the Senior Extension Officer (Women's Service). In addition, this officer maintained a regular flow of articles of women's interest in the Department's weekly sheet of press and radio copy. The "Press Clippings Service" indicated that these articles were widely used by newspapers.

Women's sessions were organised for the Agricultural Bureau State and Divisional conferences and field days, and also for some Experiment Farm field days.

Rural Homemaker Schools.—A homemaker course of five days' duration, residential, was organised. Some forty women from Agricultural Bureau and Country Women's Association branches resided at the University Sancta Sophia College for the course. Technical Education officers and staff of commercial houses co-operated with the Senior Extension Officer to make the course possible.

Extension Methods and Leadership Courses.

Extension Methods Schools.—A course of ten days' duration for field officers was scheduled to occur at Newport in March, 1953, but pressure of other activities led to cancellation of the plans. However, three other such schools were conducted: two each of five days' duration at Newport for University undergraduates of the Faculty of Agriculture, and one of five days' duration for Wagga Agricultural College students.

Examinations on "Extension Work/Methods" were set and marked for the Public Service Board's Regulation 124 examination of field officers.

Leadership/Office-bearer Schools.—Four such schools were conducted. One was held at Hawkesbury College, for five days in the winter vacation, for young men and women who came from branches of the Agricultural Bureau, the Country Women's Association, and the Junior Farmer movement.

One similar school was conducted at Port Macquarie, in collaboration with the District Supervisor of Junior Farmer Clubs. Two were held at Newport, each of eight days' duration, respectively for men and for women drawn from the above sources. The effect of the leadership/office-bearer training schools on rural groups with whom the Bureau staff make contact is definite and encouraging.

Miscellaneous Representations.

The Divisional Chief regularly represented rural and Departmental interests as a member of the New South Wales Advisory Board of Adult Education and the New South Wales Film Council. He was also regular (guest) chairman of the F.A.O. Standing Committee of the Australian Association for United Nations (New South Wales Division). The Senior Extension Officer (Women's Service) represented the New South Wales Council of Social Services in that F.A.O. Standing Committee, and represented the Agricultural Bureau in the Council of the New South Wales Bush Nursing Association. The Agricultural Bureau Organiser was a member of the New South Wales Junior Farmer Club Advisory Council.

M.I.A. AGRICULTURAL SERVICE.

The M.I.A. Agricultural Service was inaugurated in September, 1947, under Ministerial Authority, to proceed for seven years, subject to review. A notable feature of the seven years is the teamwork developed between farmers' organisations and Government departments contributing to the advancement of M.I.A. Agriculture. The tile-drainage project is a current illustration of that teamwork.

Project Highlights.

Tile Drainage.—The tile-drainage results are spectacular in some situations and in general beyond expectations. The Service is responsible for the specification of depth and spacing of the drains on individual farms, and this is currently the Service's most important project.

The specifications are based, where possible, on C.S.I.R.O. soil maps, but every farm is test bored to 7 feet. Where there is no information on the soil type, in respect of drainability, a bore-hole test is conducted—pumping from a small-diameter well and observing the effect on the surrounding water-table.

Two contractors are now operating tile-drain digging machines. A third is almost ready to commence, whilst others are expressing their interest. It is estimated that £250,000 will be spent by farmers and the W.C. & I.C. on tile drains in the next few years.

To meet the Irrigation Research and Extension Committee (IREC) call for a speed-up of soil-testing work, so that the tile-drain digging machines may not be held up, the Service has appointed a field assistant to the work, full time, with a labourer.

In two years the rate of progress of the tile drainage scheme is such as may have taken a generation. This is a tribute to the drive of Mr. George Denne, Tile-Drain Committee Secretary, a former orchardist, and secretary of the District Council of Extension Groups.

Pumping from Rivers for Pasture Irrigation.—The irrigation of pastures by pumping from the rivers has spread rapidly. There are more than thirty licensees in the Lachlan River-Wallanthery Creek area, irrigating some 10,000 acres, and as many more along the Murrumbidgee River. The properties are on the edge of a vast dry area with regular problems of feeding stock in dry years.

Sound advice at this stage is extremely important, with pastoralists turning irrigationists. The Service's two agronomists accordingly are increasingly sought for advice on establishment and management of appropriate pasture and the growth and conservation of fodder.

Italian Liaison Officer.—The appointment of a liaison officer specifically to extend farming information to Italian farmers is unique in Australian agriculture and will accelerate

the assimilation of migrants into the rural scene. The Italian liaison officer's services have been in demand not only by Service officers, but also by the W.C. & I.C. and Tile-Drain Committee secretary. He has already completed a survey of Italian-origin farmers in Yenda and Leeton districts. Amongst other things, his work has revealed farmer attitudes which were not known to Service officers, including the impression that Departmental officers are "some form of policemen".

The Italian-language newspapers *La Fiamma* and *Corriere d'Australia*, which circulate widely in the M.I.A., are now regularly receiving material based on the Service's weekly publicity releases.

Agricultural Engineer.—An Extension Agricultural Engineer has been appointed, made possible by funds from the Commonwealth Banks Rural Credits Development Fund at the request of IREC. The engineer is now surveying the extent of mechanisation of the M.I.A. large-area and horticultural farms. On the findings of the surveys his future extension activities will be based and defined.

Overseas Tours.—The M.I.A. Agricultural Organiser, Mr. D. V. Walters, is on special leave to visit California, U.S.A., as "Tour Leader" for a party of M.I.A. farmers. He has also been allotted funds from the Agricultural Extension Grant to study extension matters in U.S.A., Canada, England, Italy and the Colombo Plan countries, over a period of four months. Extension officer Dr. J. Tully, after a period at Cornell University, U.S.A., studying extension principles and philosophy, on a Smith-Mundt and Fulbright scholarship, returned to the Service in October, 1953.

Extension Groups.

The eight extension groups in the M.I.A. have maintained and, in some cases, strengthened their activity. They are sounding boards for farmer opinion when unexpected difficulties require community thought and effort. They are also media through which the Service may introduce a new or emphasise an old subject to a locality. In the past year they were, for illustration, most useful means of introducing to many M.I.A. farmers the simplicity of low-volume spraying for grasshopper control. Similarly, they were the channel through which more efficient surgical treatment of sheep foot-rot was demonstrated to many farmers.

Service officers were the main speakers at almost half the group meetings. The W.C. & I.C. supplied speakers for one-sixth of the meetings—illustrating the keenness of farmers for information on deep-well pumping, surface drainage, and tile drainage.

Combined action for all M.I.A. extension groups is obtained through the District Council of Extension Groups.

Publicity and Extension.

Farmers' Newsletter.—Some 12,000 copies of the *Newsletter* and special editions were issued. They included 5,000 to large-area farmers in four issues, a special "beef cattle" edition to 1,200 farmers, share farmers, and beef cattle raisers, 5,000 to fruit and vegetable growers in four issues and a special "Extension Group Convention" edition, covering citrus and stone fruit problems raised at the convention.

Weekly Syndicated Column.—A column comprising an average of six items, of interest to large-area, vegetable or fruit farmers, was "syndicated" weekly to six newspapers and radio stations in the M.I.A. sphere of influence.

Extension Notes.—This weekly article was first circulated to the aforementioned six newspapers and radio stations, and then to twenty other newspapers and journals in New South Wales and Victoria with circulation in the M.I.A.

Special Releases.—In all, 102 special releases were made to newspapers and radio stations, principally on pest and disease control matters raised by subject-matter specialists.

M.I.A. Orchard Spray Calendar.—This calendar, listing some fifty different sprays for various pests and diseases, was revised and reprinted. Of 2,000 copies printed, only 200 remained at the close of the year.

Bulletins.—A "Kook Spray Irrigation" bulletin was prepared and 1,000 copies were printed. A further bulletin of farm home interest, *How to Improve Your Kitchen*, was prepared, and 2,000 copies were printed.

Radio.—The Service was responsible for fifty-two quarter-hour programmes, fifty-two five-minute sessions, forty-four three-minute sessions, and fifty-two ten-minute sessions. The stations mainly concerned were 2RG Griffith, 2WG Wagga, and the A.B.C. Regional Station, 2CO Albury.

The only broadcast for which the Service pays is a five-minute "Farm Front Review", one night per week, from 2RG Griffith. Sponsors for other commercial stations' sessions include the Leeton Co-operative Cannery, International Harvester Company, and I.C.I.A.N.Z.

Films.—In collaboration with the Service, the C.S.I.R.O. Film Unit has completed a 16 mm. film "Design for Drainage" and has almost completed "Ditches and Grades" and "Houses for the Climate". The Photographic Aids Section of the Department's Division of Information and Extension Services has acquired, for the Service, footage for a film on irrigated annual pastures. Opportunity shots have been taken by Service officers. Arising from those shots is the latest "news-reel" dealing with unusual machines—a channeler, orchard spray equipment, tile-drain diggers, etc.

Show Exhibits.—As usual, the Service had a display panel in the Griffith and Leeton Agricultural Shows. The theme this year was proper feeding for quality fat lambs and beef cattle—phases of production into which many M.I.A. farmers are just now entering.

Programme Planning.

In recent months action programmes for extension campaigns in 1954-55 have been worked out. The campaign programmes concern both horticultural and large-area production, and were derived from consultation with the primary industry leaders.

Both campaign programmes have been widely reported in the press and the *Farmer's Newsletter*. They will receive priority treatment in Service officers' individual contracts, at field days and meetings, and through all publicity media.

The large-area programme will be concerned with pastures (grazing management, fodder conservation, and weed control), seed production (subterranean clover, white clover, and grass seed) and sheep (judging and classing; fluke and worm control). The horticultural programme will be concerned with soil augers, as a check on irrigation timing, and with the control of shot-hole of apricots and black spot of pomes.

Special Projects.

Red Scale Control Campaign.—Red scale control conferences have been held for some years but their effectiveness was in doubt. Service officers conferring in the 1953 winter had reported a serious build-up of scale population in the 1953 autumn and the probability of serious damage in the 1953-54 summer, especially since citrus growers' attitudes were only "moderate".

Accordingly growers organisations' co-operation was sought. The Griffith Producers' Co-operative and the Leeton Citrus Association sponsored well-attended meetings in late winter. Those meetings called for field day demonstrations of oil-spray methods, and the producer organisations organised the field days. The sum of results of this approach was that spraying methods and control greatly improved.

Farm Woodlots.—The Forestry Commission is freely making trees and advice available for experimental plantings. Two woodlots were established by the Service five years ago. The information gained, especially in respect of frost effects, salt hazards, suitability of species and so on, has been put to good effect in a third woodlot trial on a 20-acre salt-affected farm acquired by the Service. A number of irrigation treatments will be applied to test the possibility of reclaiming this type of land through woodlots.

The national value of the M.I.A. woodlot projects is indicated by the fact that for 50 miles around the countryside has almost reached the end of its firewood, fence post and sawn timber resources; whilst most farms are denuded of shade for stock and trees for aesthetic effects. Increasing requests are coming now from farmers for advice of farm woodlots.

Quarantine Regulations.—The M.I.A. is a Quarantine Area under the Irrigation Act and fruit inspectors are appointed to police the Act. In the 1953 spring a three-months publicity campaign supported the inspectors' work. It educated public opinion to the Act's requirements and the grave need to keep out fruit fly and other pests and diseases.

Seed Rice Scheme.—Committees for Tullakool, Leeton, and Griffith, respectively, have been formed by co-operation between the Rice Marketing Board, Ricegrowers' Association, and Departmental officers. The Committees have the responsibility of approving the seed rice crops as weed free and up to standard. Steady improvements in rice yields are in no small measure due to the use of pure seed.

Horticultural Census.—The Service continued the collection of data for the census of fruit trees and grape vines in the M.I.A.

The *Inventory of Plantings* of each farm is being edited. The correction and printing of *Land Use Maps* remains to be done. This task is undertaken yearly by the W.C. & I.C.

The Irrigation Research and Extension Committee now has in hand horticultural plantings figures for the past fourteen years. Their complete review is proceeding. In addition, for the past two years an estimate has been made of the productivity of each planting of mature trees of the main fruits. This data is also being examined, so that all phases of the census will have been reviewed within the next few months.



Hawkesbury Agricultural College Memorial Library, built to commemorate the services of students and staff in the Second World War was dedicated on 12th May, 1954.

Hawkesbury Agricultural College.

Student Enrolment.—Enrolments at commencement of first session were as follow, and the admissions to Agriculture I (72) were the highest ever:—

Course.	1953.	1954.
Agriculture—Third Year	64	55
Agriculture—Second Year.....	62	63
Agriculture—First Year.....	70	72
Horticulture—Third Year	...	...
Dairy—Second Year	8	9
Dairy—First Year	9	7
Food Technology—Second Year ...	6	4
Food Technology—First Year	5	6
Totals	224	216

Of the student total, nine are from other States or from overseas, whilst 56 per cent. of the New South Wales students are from country districts, including many members of Junior Farmer Clubs. The admission from Agricultural High Schools in 1954 was fourteen.

It was possible this year to admit all eligible applicants who had applied before June, 1953. Applications for admission to the diploma courses in Dairying and Food Technology have not in recent years exceeded half the available places.

Diploma Examinations.—A record number (sixty-two) of students in the Agriculture Diploma Course were successful in the final examinations, eleven at Honours standard. Eight students successfully completed the Dairying Diploma Course, two at Honours standard. Six successfully completed the Food Technology Diploma Course, two at Honours standard.

Ex-Students.—The total of students who have attended since the inception of the College, including those now in residence, is 5,043. The proportion following vocations appropriate to their agricultural training is now estimated at 78 per cent.

Extra-curricula.—The Hawkesbury debating team reached the final of the inter-collegiate competition sponsored by the Australian Broadcasting Commission, winning four of the five debates contested.

College Library.—The Memorial Library was dedicated on Diploma Day, 1954, and the library is now located in this new building which has accommodation to seat fifty-five at one time.

One hundred and twenty new books were received. The pamphlet collection has almost doubled during the year and a large scale pamphlet acquisition programme has been launched.

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The periodicals collection has been completely catalogued. Fifteen additional periodicals are now regularly received, bringing that total to ninety.

Student Tours, Visits.—Senior Agriculture students visited the M.I.A. for first-hand experience of irrigation techniques. The Annual "South-Western Tour" was also fulfilled by Third Year students. Senior Dairy students made the annual tour of Hunter Valley dairy factories and also visited major dairy product and cold store establishments in the metropolitan area. All Food Technology students were conducted on inspections of commercial canneries in operation, and the Second Year class visited Leeton Co-operative Cannery for one week. This class also spent several days at Gordon Edgell & Sons Ltd., Cooma, for commercial experience of vegetable processing.

University Undergraduate Courses.—The College regularly provided practical demonstrations in livestock husbandry and agricultural machinery matters for students in the second year of the Sydney University Faculty of Agriculture. These students visited Hawkesbury one day each week for the demonstrations.

Farmers' Schools, Conferences, Field Days, etc.—Winter Schools for farmers were respectively conducted in dairy farming, pig raising, poultry farming, vegetable growing and tractor maintenance. Schools in dairy farming and in pig raising were provided for Junior Farmers. The Annual Poultry Field Day was held. The Annual State Conference of the Agricultural Bureau of New South Wales and a Leadership School for members of the Agricultural Bureau, Country Women's Association, Junior Farmer Clubs, and other rural organisations, were conducted in the winter vacation.

The College facilities were made available to the Australian Society of Dairy Technology (New South Wales Branch) and also for a conference of Managers of Experiment Farms and Stations.

Buildings, etc.—Buildings completed were the Memorial Library and the research glasshouse. General construction of the new dairy produce factory was finished, and funds are now available for the installation of outstanding items of plant and equipment.

Sectional Operations at Hawkesbury.

College Farm.—Two hundred and seven tons of oaten and wheaten hay were harvested from 275 acres. At 30th June, 1954, 200 tons of cereal hay were on hand. Approximately 350 tons of ensilage were made in the autumn of 1954 from 40 acres of maize, 2 acres of sorghum, 10 acres of Japanese millet, sweet corn stalks, etc. There is now a good reserve of ensilage.

Pastures previously established and those sown early in 1953 made good growth. Later sown pastures were not so good. All legumes sown were inoculated. Some 227 acres of

pastures were established in 1953, and 165 acres were sown in 1954. Surplus pasturage conserved as baled hay and straw included 9 tons of Wimmera ryegrass from 25 acres, 8 tons of subterranean clover—*Phalaris*, and 7 tons of *Paspalum*.

A start has been made with re-designing of the irrigation main, to make possible the irrigation of practically the entire River Farm.

Mechanisation.—The College undertook, in co-operation with machinery firms, the testing of many items of machinery—including a low volume weed sprayer, a low density pick-up baler, a grasslands roller drill, a seed and fertiliser drill, grain augers, re-lugged tractor tyres, broadcasters, and others.

One new tractor was received on loan and six others were replaced by machinery firms with later models. Thirty-one new items of machinery were acquired, provided on loan by firms or purchased.

The main tractor firms again co-operated to make a success of the winter school on Tractor Maintenance, which was attended by 100 farmers.

Research Agronomy.—Developments of special interest were the extension of district pasture experiments, the completion of the research glasshouse and the appointment of an agronomist to specialise in plant nutrition research. Vegetable breeding and the maize programme have progressed. The development of hybrid tomatoes, the breeding of beans for resistance to anthracnose and rust, and of tomatoes for resistance to Fusarium Wilt and for agronomic qualities, and many other agronomy projects were incorporated in the report of the Department's Division of Plant Industry.

Orchard Section.—Reflecting the dry season the orchard cropped very lightly. For instructional purposes about 1,000 trifoliata and rough lemon rootstocks, and 500 apricot and peach seedlings, have been planted out in the nursery. The irrigation plant and pipe line for Yarramundi orchard have been installed but irrigation has not commenced.

Cannery and Food Technology.—A commercial sized pea viner and pea cleaner acquired during the year will facilitate quantity processing of peas by the cannery.

Production of processed foods included 1,123 x 30-oz. cans of soups and sauces, 100,000 lb. of jams, 2,000 cans of fruit, 6,500 x 30-oz. cans of vegetables, 5,000 lb. of canned and frozen fruit pulps. Quick frozen foods included 2,000 lb. of fruit and vegetables. Some 476 lb. of dehydrated fruit was also produced.

Most of the fruit was supplied by the College orchard. Vegetables grown by the College for processing included beans, broccoli, carrots, cauliflower, parsnips, peas, sweet corn, and tomatoes.

Dairy Produce Factory.—Record production of butter and cheese heavily taxed the old dairy produce factory. A new "Zero" type churn and a new cheese vat were installed; otherwise the milk and cream quantities received could not have been handled. It is hoped that operations in the new factory will commence early in the new year. Installation of the spray drier and milk pasteurising and bottling plant is near to completion. Considerable plant has yet to be delivered.

The Second Year Dairy students entered the "Open class" of the butter, cheese and cream grading competitions conducted by the Institute of Dairy Factory Managers and Secretaries, winning first prize for cream grading and second prize for cheese grading.

Dairy Research Section.—The Dairy Research Officer published papers on: "Some Factors Affecting Rate of Machine Milking", "The Hemmons Milk Flow Recorder and Sampling Device", "Rate of Milking—Some Important Factors", and "Cleaners for Milking Machines". A "Milking Machine Efficiency Field Manual" has been prepared.

Investigations of the following were initiated:—Olfiphant germicidal ultra-violet lights; glass pipes line for in-place cleaning; cheese packaging in paraffined cellophane; butter quality—astrigent after-effect on palate.

Cattle Breeding and Management Section.—A school for dairy farmers was conducted in the 1954 winter vacation. Demonstrations in cattle husbandry were given to University Second Year Agricultural students, and a course of lectures on animal management was provided for the First Year Dairy students of the College.

The Jersey Stud at 30th June, 1954, totalled 113 head, including eleven bulls on loan to farmers. The Friesian Stud totalled ninety-three head. Sixteen head of Jerseys and fourteen head of Friesians were sold. The demand for College stock cannot be met in full. Of fourteen Jersey cows submitted to the Classification Committee of the Jersey Herd Society, eleven were awarded the Highly Commended rating and three the Commended rating.

Arising from the Loan Bull Scheme, the first bull to be returned for use in the College Stud, in accordance with the formula of the Scheme, is "Richmond Mischief's Pinnacle". There have been very favourable reports on the general type and quality of the stock he has sired. A notable introduction of new blood into the College Jersey herd was made by purchase (200 guineas) at the Royal Agricultural Society Show sales of "St. Cloud Mermaid's Supreme" from Sir Frederick Stewart.

The Aberdeen Angus Stud now totals thirty-eight head, including five adult bulls. Three bulls were sold during the year. All beef cattle investigational work at the College has been abandoned, at least temporarily, because of staff shortage.

Piggery Section.—The breeding stock at 30th June, 1954, comprised twelve boars (five Tamworths, four Berkshires, three Large Whites), and thirty-five sows (fourteen Tamworths, twelve Berkshires, nine Large Whites). The demand for College stock has been very heavy and there is a lengthy waiting list for all breeds. The stud sales comprised ninety-seven head.

A Pig Raiser's School was conducted by the Section in the winter vacation.

Poultry Section.—This section conducted a winter school for poultry farmers, another for Junior Farmers, and the Annual Poultry Field Day, in addition to normal College courses and demonstrations for University Second Year students.

Breeding operations were conducted with White Leghorns, Australorps, Chinese Langshans, Rhode Island Reds, and turkeys. At 30th June, 1954, the stock totalled 1,414 head. Egg production for the year was 18,365 dozen.

The 1st Random Sample Test terminated on 16th March, 1954. The results were beyond the expectations and have aroused considerable interest and acclaim. The 2nd Test commenced on 12th August, 1953; with nine groups, whereas there were six groups in the 1st Test.

The 1953-54 Egg Laying Competition ended on 16th March, 1954. It was the first conducted in Australia in laying cages. The results were quite satisfactory. On 1st April, 1954, the 1954-55 Competition commenced, with 270 competing birds.

Sheep and Wool Section.—The stock are divided as follows:—Romney Marsh Stud (sixty-two head); ration sheep; commercial flock (530, including sixty-six rams).

Preliminary observations of the value of stabilised pyrethrum formulations for sheep blowfly prevention are being carried out by the Sheep Section in collaboration with the Entomological Branch of the Department.

The following equipment was made available by firms this year:—A Cooper "RV" type jetting plant and a Buzacott electric single-stand overhead shearing plant.

Apiary Section.—The hives totalled sixty-six at 30th June, 1954. Honey produced was 2,700 lb. Demand for College bred queen bees was heavy throughout the State. Some sixty queens were sold. Many others were raised for artificial insemination experiments at the College. Special equipment, including manipulating apparatus for instrumental insemination of queen bees, has arrived from the United States of America, and, with other microscope equipment, has been set up at the College apiary for selective breeding and controlled mating by artificial insemination.

WAGGA AGRICULTURAL COLLEGE AND EXPERIMENT STATION.

Student Enrolment, 1954.—Intake is still limited by available accommodation. A peak figure of fifty-nine students was reached in the First Session of 1954. Mid-year comparisons are tabulated:—

	Enrolled Students—		
	At 1-7-52.	At 1-7-53.	At 1-7-54.
Third Year	14	17	15
Second Year	18	21	16
First Year	21	18	26
Total	53	56	57

Demand for enrolment has steadily increased, and at 30th June, 1954, bookings on the basis of existing accommodation are complete.

Diploma Examinations.—All seventeen students in the third year successfully completed the 1953 Diploma in Agriculture examinations. The Dux of the course gained Honours at Graduation. The Third Annual Diploma Day was held on 14th May, 1954. Attendance was 400.

Ex-student Statistics.—At 30th June, 1954, there were ninety-three ex-students, sixty of whom had gained Diplomas (including ten Honours graduates). The remaining thirty-three had departed before the end of their second year at the College. Occupations of all ex-students are revealed as:—

Actively engaged in farm work	49
Departmental officers	17
Employed by commercial firms with agricultural interests	13
Left agriculture (6) and occupations unknown (8)	14
Total	93

Students' Tours.—Three regular tours, "Northern" (four days in October, 1953); "Batlow" (three days in November, 1953); and "M.I.A." (five days in April, 1954) were again undertaken by all senior students. Various half- or one-day tours were conducted to certain sheep and/or cattle studs, the Soil Conservation Research Station, the Wagga Wagga Municipal Abattoirs, the Murrumbidgee Milling Company's Flour Mill and the Murrumbidgee Dairy Company's Factory. An innovation this year was a full-day visit to an outstanding mixed farm near Gundagai during mechanical maize-picking operations.

Students visited the Sydney Royal Easter Show, the Murrumbidgee Pastoral and Agricultural Association's Annual Show in Wagga, and the Wagga Ram Show and Sales, for educational purposes, experience as stock attendants and/or as competitors in stock and produce judging competitions. Opportunity was also taken to give students experience at local Livestock Sale Yards.

Extra-Curricular Activities.—Rugby Union football, athletics, swimming, rifle-shooting and tennis continue to be the main sporting activities, but boxing and basketball formally entered the lists of College sporting activities this year, with an annual tournament and an entry into a local competition respectively.

The College, for the first time, entered a team and won the Australian Broadcasting Commission's trophy for Inter-Agricultural College Debating in the second year of this competition. Music and photography clubs continued to flourish.

Farmers' Schools, Conferences, Field Days, etc.—The Fourth Junior Farmers' Winter School, in Wheat-growing and Sheep Husbandry, commenced on 28th June, 1954 (attendance fifteen).

The Second Turkey Raisers' School and Conference was held in July, 1953 (attendance forty-three).

The Second Tractor and Farm Machinery Maintenance School for farmers was held in July, 1953 (attendance thirty-six).

A Livestock Field Day was held on 21st August, 1953 (attendance approximately seventy). That allowed the College's Annual Field Day on 6th November, 1953 (attendance approximately 150) to be devoted mainly to agronomy problems comprising weed control, pasture improvement, crop rotations, and crop-breeding techniques and results.

Other small groups comprising Junior Farmers' clubs, parties of touring New Zealand farmers, officers of other Departments and of firms specifically interested in skeleton weed control work, Pakistanis, R.A.A.F. trainees, and local farmers' organisations visited the College on sixteen occasions in all, for informal occasions, averaging approximately half a day each.

The College provided facilities for regular meetings of the Southern Region Advisory Committee, and for two conferences of Southern Region extension officers. An Experiment Farm "Policy, Objectives and Developments" Conference, a Division of Plant Industry Regional Conference, and the inaugural meeting of the Wagga Agricultural Research Institute's Advisory Committee were all held at the College during the year.

Various College officers judged or acted as stewards at local country shows, assisted with the judging of Field Competitions and/or assisted at field days on farmers' or junior farmers' properties, and gave appropriate talks or demonstrations.

Buildings, Works, Fences, Improvements.—The Wagga Agricultural Research Institute building has progressed slowly and is now nearing completion.

The glasshouse donated by the Rural Bank of New South Wales was erected and has been in use for some months. Part supplies for a prefabricated glass potting shed adjunct have arrived.

The reticulation and provision of necessary motors and power outlets from the 3-phase electricity supply have been completed.

Considerable progress has been made with the installation of a filtered water supply from the Southern Riverina County Council's storage reservoir at Bomen.

Work is proceeding with the stockyards and other buildings and subdivisions required adequately to accommodate the newly-acquired Poll Shorthorn Beef Cattle Stud.

Bills of quantities have been prepared in readiness for calling tenders for the proposed Administration Block and associated buildings.

One of the four newer cottages has had an 8 ft. x 20 ft. glassed-in verandah built on to it.

Piping for sewage-effluent disposal has been connected. A start has been made on long-needed concrete work in and about the College quarters.

Partial conversion of the old shearing shed to a carpenter's shop was effected. Numerous small maintenance renovations and additions to the College quarters were carried out.

One mile of boundary fence was renewed, half a mile of new, rabbit-proof, subdivision was completed and one mile of subdivision was replaced.

Clearing.—A further 200 acres of country was cleared for cultivation.

Plant.—The following major plant items were received: one concrete mixer, one 20-tyne scarifier, one 12 ft. fertiliser spreader, one 8 ft. pasture harrow, four grain silos, each of 1,500 bushel capacity, one all-steel saw bench, one scoop, one rabbit-ripper, one poison cart, one rod weeder, one roller seeder, one motor lawnmower.

Farm Water Supply.—Most of the uncompleted reticulation from new surface tanks and wells installed in the 1952-53 financial year was completed. A further new well site was confirmed in paddock No. 10 by test-boring. The windmill and casing for this second proposed well were received. The No. 1 well in the northern portion of this area was brought into operation and is providing adequate supplies for large stock in three hitherto "dry" paddocks. Attempts, so far unsuccessful, were made to locate underground water conveniently near the site of the new beef cattle yards. The main river pump and supply continued to function somewhat inadequately during the summer, and again required considerable maintenance. The new filtered water supply is expected to relieve the situation.

Rabbit Control.—Systematic follow-up of previous work has kept the rabbit population low.

Farm Forestry and Aesthetic Improvements.—A break of about 100 Eucalypt trees was planted along the most bare portion of the relatively treeless middle section of the Farm. Approximately 1½ mile length of the main drive, mainly peppers and kurrajongs, was lopped and made good regrowth.

Further native cypress pine regeneration occurred in the southern "pine paddocks". The kurrajong nursery reached a stage where, from next year, trees will be available for planting out.

Within the limits imposed by the current necessity to retain old buildings for essential storages, the "farmstead" landscape was further improved. The College garden now draws favourable autumn and spring comment.

Fodder Production and Conservation.—The 1953 cropping season finished favourably. The following quantities of fodder were harvested and stored:—

Grain.—Wheat 6,360 bushels, oats 1,010 bushels, barley 440 bushels, rye 102 bushels.

Hay.—Wheaten 91 tons, oaten 19 tons, lucerne 28 tons, pasture 7 tons.

Silage.—Chaffed 160 tons, pitted 50 tons.

Unfortunately, 1954 set in dry and has remained so. Consequently the above reserves have all had to be drawn upon consistently, since early autumn, for all classes of stock.

Pure Seed Production.—Favourable yields gave the following quantities for distribution to Registered Seed Growers, Farmers' Experiments, Variety Trials here and at other Departmental Farms, and, as seed for the College Farm cropping: wheat 468 bushels (six varieties), oats 225 bushels (eight varieties), barley 336 bushels (four varieties). The total of all cereal grain harvested was thus approximately 9,000 bushels. In addition, 1,100 lb. of Wimmera rye grass seed were harvested and cleaned.

1953-54 Cropping Operations.—A normal fallow area of some 500 acres was prepared. However, after the excellent harvest weather the season remained dry, with only two substantial falls of rain, one in January and the next in early June. The conditions inhibited good follow-up workings, rendered top-dressing temporarily ineffective and delayed the main crop sowing. Even so, the following operations were completed by mid-June:—

Lucerne.—50 acres sown September, 1953, bringing the total to 112 acres.

Seed Production.—112 acres sown, comprised of wheat, 67; oats, 25; barley, 16; safflower, 4 acres.

Fodder (grain and hay).—333 acres sown, including 233 of wheat, 45 of oats and 33 of barley.

Pasture Top-dressing.—Of 820 acres of sown pasture, 280 acres were top-dressed.

Cereal Breeding and Other Agronomic Research.—There was an administrative change in this section involving transfer of agronomy staff to the Director of the Agricultural Research Institute, who now controls the genetical investigations, wheat breeding, and cereal pathology at Wagga; the oat and barley breeding at Temora Experiment Farm; allied work on pasture breeding, principally with subterranean clover, Wimmera rye grass, *Phalaris* spp., and lucerne; and the more fundamental research aspects of weed control, particularly skeleton weed. In effect, all this work is continuing mainly at the College on an intensified scale.

Two promising strains of oats have been widely distributed for field testing. A locally-bred wheat, Curlew, proved outstanding in 1/40 acre trials, with yields commonly of the order of 40 to 50 bushels per acre in 1953.

In cereal breeding, a change in technique from pedigree methods to back-crossing was initiated to produce ultimate improvements more quickly. The glasshouse has already demonstrated its value for this and disease-resistance work in particular.

The comprehensive range of skeleton weed control experiments was continued with particular emphasis on pasture and clovers' reaction to different times and rates of application of various formulations of hormone herbicides. The College continued to be the focal point of applied research in this field.

The pasture research programme has been reoriented. Subterranean clover and *Phalaris* spp. breeding and strain testing were intensified.

Dairy Section.—The stud Jersey herd numbers ninety-eight with an average of thirty in milk. The adverse season and a high incidence of mastitis have kept production down. Routine hygiene and rigid culling (fifteen cows) are practised to control mastitis. Seven stud bulls were sold at an average price of 34½ guineas. One new young bull was purchased at Sydney Show for 130 guineas. Transfers of four other stud bulls to and from Hawkesbury Agricultural College and to and from private breeders (on loan) also occurred. Small teams were exhibited at Sydney and Wagga Shows with moderate success.

Piggery Section.—An average of 115 pigs of the Berkshire, Large White and Tamworth breeds was maintained throughout the year. The demand for stud stock, especially Tamworth boars and Berkshire sows, continued to exceed supply. In all thirty boars and thirty-five sows were sold to farmers and other Government Institutions. Eighty-eight pigs were supplied to the quarters for pork and bacon.

Awards gained by College stock at Wagga Show were five championship, eleven first and five second prizes. At Sydney Show a Very Highly Commended award was gained, and a Berkshire sow under eight months made a record by selling for 90 guineas at auction.

The Piggery has been improved by an emergency water supply. A small irrigation plant has been established to handle the farrowing pen effluent and to raise green fodder.

Horse Section.—The transition from draught horses to mechanisation for farm working is complete. However, the horse population stands at sixty-seven, comprised of four entires, forty mares, nine geldings and fourteen foals. Of this total, thirty-five are pure bred Arabs.

Four Arabs were sold during the year, including one colt to New Zealand. Arabs were exhibited at both Sydney Royal and Wagga Shows with some success. Nine horses were transferred to other institutions. Demand for services of the Arab stallion continues to be high.

Beef Cattle Section.—A Poll Shorthorn beef cattle stud was commenced with the acquisition of the bull "Kaluga Air Raid", Junior Champion at Sydney Royal Show, and thirteen stud

cows purchased from two leading New South Wales breeders. To date, seven of the cows have calved, bringing the stud to twenty-one head.

Sheep Section (Dorset Horn Stud).—Stud mating, using hand service, commenced on 28th October and 320 ewes were mated to five stud rams. Unfavourable conditions during mating resulted in about 100 ewes failing to bear lambs. Lambing commenced on 25th March and 225 lambs were dropped. Last year's lambing troubles did not recur but a considerable number of lambs was destroyed by stray dogs. Disease incidence was low. A mild outbreak of pink-eye and isolated cases of pregnancy toxæmia at lambing time were recorded. Routine worm-drenching and inoculation against scabby mouth and pulpy kidney were carried out.

Eleven hundred sheep were shorn to realise twenty-five bales of wool. Seventy-five ewes were culled from the stud after classing. Flock rams were supplied to satisfy Departmental requirements elsewhere, and thirty surplus rams were auctioned at Cowra and Wagga Ram Shows and Sales. The constant demand for stud and flock rams could not be met. A further ram was purchased from the Lindsbury Stud, Cudal, and joined with 122 top stud ewes.

Some cross-bred lambs were bred for student instruction; and a normal quota of ration sheep, averaging seventeen per week, was supplied to the quarters.

Poultry Section.—A drinking nipple system of watering was installed in the breeding pens. A three horse-power electric motor was installed in the feed room. Two semi-intensive pens were furnished with electric light for improved winter egg-production.

New blood lines from Hawkesbury and Seven Hills have been introduced and progeny are performing well.

White Hollands and Black Norfolks were added to the turkey flock to anticipate the demand for a smaller type bird. Trapnesting of a turkey pen and subsequent weekly measurement of growth rates were used for the first time in selecting hens for breeding. An excellent rearing season resulted in the maximum number of turkeys that can be carried with existing facilities, viz., 300.

Demand for stud cockerels and egg settings was poor, but the demand for gobblers and day-old Australorp chicks exceeded supply.

Apiary Section.—Another excellent season almost equalled the previous year and yielded 3,600 lb. honey from twenty-three colonies.

Orchard Section.—Spring and summer were favourable for fruit setting, but dry conditions reduced fruit size. The pear crop was a record, although nearly 40 per cent. was unmarketable owing to small size. The apple crop was also big, and one consignment realised top prices on the Sydney market. Olives were erratic and light.

Extension of the stone fruit section is planned. A small nursery for student instruction was established. Almond, apple and pear trials were continued. Again Northern Spy proved the best apple stock.

Research and investigational projects in hand at the various Experiment Farms and Stations, and at Hawkesbury and Wagga Agricultural Colleges, are for the greater part incorporated in the reports of the respective Divisions of Plant Industry, Animal Industry, Dairying, and Horticulture.

Yours faithfully,

R. J. NOBLE,

Under Secretary and Director.

APPENDIX

THE ACCOUNTS of the DEPARTMENT OF AGRICULTURE 1953-54

THE ACCOUNTANT.

There was an increase in the expenditure from Consolidated Revenue Fund and General Loan Account during the financial year.

Comparative Statement of Expenditure.

Account	1952-53.	1953-54.	Increase.
	£ s. d.	£ s. d.	£ s. d.
Consolidated Revenue Fund	2,594,774 7 10	2,837,462 10 9	242,688 2 11
General Loan Account	105,291 1 8	145,447 2 2	40,156 0 6
	£ 2,700,065 9 6	2,982,909 12 11	282,844 3 5

Expenditure from General Loan Account.

The Loan expenditure for the year was £145,447 2s. 2d., of which £65,110 4s. 9d. was spent at the Hawkesbury Agricultural College, £43,378 0s. 11d. at Wagga Agricultural College and Experiment Station; £31,749 1s. 3d. at Experiment Farms and Nurseries; £5,191 15s. 6d. at Glenfield Veterinary Research Station; and £17 19s. 9d. on cattle dip construction at East Goondiwindi on the Queensland border.

Special Deposits Accounts.

In addition to the regular appropriation accounts of expenditure from Consolidated Revenue Fund and General Loan Account, there are a number of Special Deposits Accounts opened with the Treasury in terms of the Special Deposits Act of 1911. These accounts are credited with receipts and are drawn upon to meet disbursements of a special nature. The more important of such accounts are referred to hereunder:—

Swine Compensation Fund.

In terms of the Swine Compensation Act, 1928-1935, this Fund was established for the payment of compensation to owners of pigs destroyed and carcasses condemned in accordance with the provisions of the Act. The account is credited with moneys collected by the Commissioner of Stamp Duties in respect of swine duty, originally fixed at 1s. per head, reduced to 9d. per head from 1st March, 1935, and increased to 1s. 3d. per head on 1st October, 1945, and to 2s. per head from 1st May, 1948, on all pigs delivered for slaughter to an abattoir. Fines paid for breaches under the Swine Compensation Act, 1928-1935, are also credited to the Fund.

In the case of a pig ordered to be destroyed because it is suffering from or suspected of suffering from disease, the compensation is fixed by the Act at the full market value of the pig, less its residual value if on destruction it is found to be free from disease; and seven-eighths of the market value of the pig, less the residual value if it is found to be diseased on destruction.

In regard to the compensation payable in respect of a condemned carcass, under the original regulations the amount of compensation was the full market value of the animal prior to slaughter, less the residual value of the carcass; one-third of such market value, less residual value in respect of condemned fore-quarters; and two-thirds of such market value, less residual value in respect of condemned hind-quarters. Under an amendment to this regulation made on 12th March, 1937, the amount of compensation for a condemned carcass was reduced to three-quarters of the market value of the pig immediately prior to slaughter, to one-quarter of such market value in the case of a condemned fore-quarter and to one-half the market value in respect of a condemned hind-quarter. The market value of any pig is not to be deemed for the purpose of the Act to exceed (a) if a pig is a stud pig, £20; and (b) if the pig is not a stud pig, £10. For the purposes of the regulation "stud" pig means a pig registered by the Australian Stud Pig Breeders' Society.

Prior to 31st December, 1937, compensation was payable in the case of various diseases, including Tuberculosis, Swine Fever and Anthrax. By a proclamation which came into operation on 31st December, 1937, all diseases, apart from the three specifically mentioned, were excluded from the provisions of the Act. By proclamation, Brucellosis was added to these diseases in January, 1941, and Septicæmia on 15th January, 1943.

In addition to compensation, the Fund is charged with the cost of printing and distributing swine duty stamps and expenses incurred in obtaining a determination of the valuation of a pig for the purposes of determining the amount of compensation.

The operations on the Swine Compensation Fund for 1953-1954 are summarised hereunder:—

	£ s. d.
Balance at 1st July, 1953	2,170 6 4
Receipts—Stamp Duty	47,344 17 10
	49,515 4 2

Disbursements—

	£ s. d.
Swine Compensation	41,647 4 1
Commission on Duty Stamps	957 11 4
	42,604 15 5
Balance at 30th June, 1954	£6,910 8 9

The figures shown above do not include transfers between funds.

The Fund was indebted to the Treasury in an amount of £16,000 at 30th June, 1954.

Fund created by the Wheat Marketing (Barring of Claims) Act, No. 22 of 1929 (as amended by Act No. 38 of 1930).

In terms of the Wheat Marketing (Barring of Claims) Act, 1929, all claims against the Government in respect of old wheat pools were barred. The State Wheat Office was closed and the funds in the hands of the State Wheat Board were paid to the Treasury. After payments of expenses incurred in financial operations, such funds were to be applied in making certain payments to the University of Sydney and to specified trustees for purposes incidental to and in connection with research work, and the balance of the moneys invested by the Colonial Treasurer in Government stock, the interest therefrom to be spent on agricultural education or research as the Minister for Agriculture may direct. Any interest unexpended at the end of a year is to be capitalised.

No payments were received from the Roumanian Government in respect of Roumanian bonds which were accepted subject to specified dates of payment in settlement of wheat supplied from early wheat pools.

At 30th June, 1954, the Fund had assets amounting to £35,733 15s. 9d. comprising Australian Consolidated Inscribed Stock £34,260; cash in bank £1,189 2s. 4d.; and accrued interest £284 13s. 5d. These figures are exclusive of assets in course of realisation, amounting to £24,620 (less £1,108 principal repaid) approximately, representing the balance of the New South Wales share of the original value, viz., £120,000 of Roumanian Bonds held by the trustees of the Australian Wheat Board, Melbourne, on account of the various States.

No payments were made from the Fund during the year, but an amount of £1,137 7s. 2d. was set aside to meet outstanding commitments.

The Revenue Account and Balance Sheet of the Fund for the year ended 30th June, 1954, are shown hereunder:—

Revenue Account for the year ended 30th June, 1954.

	£	s.	d.		£	s.	d.
To Commitments—30th June, 1954	1,137	7	2	By Interest on Investments (Government Securities)	1,124	9	8
				„ Bank Interest	12	17	6
	£1,137	7	2		£1,137	7	2

Balance Sheet as at 30th June, 1954.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
Accumulated Funds as at 1st July, 1953	34,594	1	4	Investments in Government Securities (face value)	34,260	0	0
Unexpended balance of commitments at 30th June, 1953, capitalised	2	7	3	Balance at Commonwealth Savings Bank	1,189	2	4
				Interest accrued at 30th June, 1954	284	13	5
Accumulated Funds as at 30th June, 1954	34,596	8	7				
Commitments—30th June, 1954	1,137	7	2				
	£35,733	15	9		£35,733	15	9

Western Division Public Watering Places Fund.

The controlling authorities of public watering places in the Western Division of the State are required by section 78 (3) of the Pastures Protection Act, No. 35 of 1934, to pay to the Minister not later than 31st January in each year all moneys in their Public Watering Places funds in excess of the sum of £100. The moneys so paid to the Minister are credited to a Special Deposits Account at the Treasury called the “Western Division Public Watering Places Fund”. The moneys so credited are used in the construction or maintenance of tanks, dams and other structures, machinery or works for storing or providing water or otherwise improving public watering places in the Western Division.

The operations on the account during 1953-54 are shown hereunder:—

	£	s.	d.
Balance at 1st July, 1953	223	11	11
Receipts	758	16	1
	£982	8	0
Payments	981	17	7
Balance at 30th June, 1954	£0	10	5

Noxious Insects Destruction Account.

Section 10 (1) of the Noxious Insects Act, No. 22 of 1934, provides that such Pastures Protection Boards as are from time to time specified by proclamation published in the *Gazette* shall in each year make and levy a special rate in the amount prescribed in respect of such year on each owner or occupier of ratable land within the district in respect of large stock and sheep for which he is liable to pay rates under Part II of the Pastures Protection Act, 1912, or under any Act amending or replacing same.

Such special rate shall not exceed one penny per head in the case of large stock and one-sixth of a penny per head in the case of sheep.

The amounts received in respect of rates so levied are paid by the Boards to the Minister as a contribution to the cost of suppression and destruction of noxious insects.

All contributions received by the Minister are paid into an account in the Special Deposits Account at the Treasury called the “Noxious Insects Destruction Account”. Moneys

at the credit of such account are applied by the Minister to the purchase of materials, equipment, etc., for the suppression and destruction of noxious insects and for other purposes connected therewith or incidental thereto, and to repay to the Colonial Treasurer any moneys advanced by him.

Receipts and payments for each year since the passing of the Act in 1934 are shown hereunder:—

Financial Year.	Receipts from Pastures Protection Boards.	Payments.
	£ s. d.	£ s. d.
1934-35.....	925 14 10	10,274 8 8
1935-36.....	1,712 1 0	731 10 10
1936-37.....	7,941 2 4	2 4 7
1937-38.....	8,707 11 11	42,161 1 11
1938-39.....	27,495 5 3	8,244 8 10
1939-40.....	17,032 2 6	5,676 16 4
1940-41.....	7,936 12 5	1,858 5 11
1941-42.....	1,169 6 3	94 16 0
1942-43.....	772 4 0	641 10 8
1943-44.....	221 1 6	1,323 16 0
1944-45.....	393 15 4	250 5 5
1945-46.....	40 17 1	48 16 8
1946-47.....	524 16 2	4,823 2 10
1947-48.....	1,913 0 6	5,534 18 6
1948-49.....	11,099 15 2	3,197 6 9
1949-50.....	664 16 3	616 13 9
1950-51.....	924 11 0	1,564 4 9
1951-52.....	46 11 5	128 16 0
1952-53.....	1 0 0	85 14 5
1953-54.....	4,404 14 0	128,949 2 7
Add Advance by Treasury	93,926 18 11 150,000 0 0	216,208 1 5
Balance in Special Deposits Account at 30th June, 1954 .....	.....	27,718 17 6
£	243,926 18 11	243,926 18 11

The following is a summary of the transactions on the Noxious Insects Destruction Account for the financial year 1953-54:—

Receipts and Payments for the Financial Year 1953-54.

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
To Balance at 1st July, 1953	2,263	6	1	By Poisons	117,487	4	1
„ Levies	4,236	2	9	„ Hire of Aircraft	6,672	13	6
„ Advance by Treasury	150,000	0	0	„ Aircraft fuel	1,000	13	6
„ Sundries	168	11	3	„ Personal Insurance—			
				Aircraft flights	5	19	0
				„ Travelling Expenses	658	15	6
				„ Wages paid by Pastures Protection Boards—			
				Re-imbursement	709	9	5
				„ Payroll Tax	1	4	4
				„ Maintenance of Motor Vehicles	284	10	11
				„ Freight and Cartage	135	12	7
				„ Rent	13	0	0
				„ Advertising	65	8	6
				„ Plant purchases	1,913	3	9
				„ Telephone calls	1	7	6
					128,949	2	7
				„ Balance at 30th June, 1954	27,718	17	6
	£156,668	0	1		£156,668	0	1

Registration of Orchards and Nurseries.

The operations on the account for the year 1953-54 are summarised hereunder:—

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
To Balance at 1st July, 1953	112	0	4	By Part Cost of Microscope	112	0	4
				„ Balance			
	£112	0	4		£112	0	4

The account has now been closed.

Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station.

The Council of Advice of the Pastures Protection Boards of New South Wales agreed in 1934 to meet the salaries and travelling expenses of two research officers in veterinary science to be attached to the Glenfield Veterinary Research Station and to defray the cost of such materials and experimental animals

as may be agreed upon. The subjects of major research on which officers are to be engaged are decided upon by the Council on the recommendation of a committee consisting of the Chief, Division of Animal Industry, and the Director of Veterinary Research.

The following is a summary of transactions on the account for the financial year 1953-54:—

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
To Balance at 1st July, 1953	150	4	10	By Salaries	1,199	17	1
„ Contributions	1,500	0	0	„ Payroll Tax	8	2	4
				„ Workers' Compensation Insurance	21	6	0
				„ Balance at 30th June, 1954	420	19	5
	£1,650	4	10		£1,650	4	10

The figures in the above statement do not include transfers between funds.

Veterinary Surgeons' Act, No. 25 of 1923.

This Act provides for the establishment of a Board to be called "Board of Veterinary Surgeons of New South Wales". Fees and penalties collected under the Act are paid to the

credit of Consolidated Revenue Fund, from which administrative expenses are met. At 30th June, 1954, there were 353 registered Veterinary Surgeons.

The statement of receipts and payments for the financial year 1953-54 is shown hereunder:—

RECEIPTS.				PAYMENTS.			
	£	s.	d.		£	s.	d.
To Registration Fees	40	19	0	By Board Fees	97	13	0
„ Restoration Fees	4	4	0	„ Travelling Expenses	32	4	8
„ Roll Fees	574	7	0	„ Printing	62	9	9
„ Examination Fees	105	0	0	„ Postage	23	13	0
				„ Salaries	411	14	7
				„ Examination of foreign veterinarians	84	4	8
					£711	19	8
				„ Balance at 30th June, 1954	12	10	4
	£724	10	0		£724	10	0

Contribution by Milk Board towards cost of Herd Testing.

In 1937, the Chief Veterinary Surgeon of the Department was appointed as Consulting Veterinarian to the Milk Board to supervise and control the testing of cows for tuberculosis and matters associated therewith. The Milk Board agreed to provide up to £1,250 per annum from 1st July, 1937, to meet the cost of the services to be performed by the Department. This contribution was varied from time to time in accordance

with the rise and fall in the actual expenditure. From the financial year 1952-53 the Board agreed to meet the actual cost of T.B. testing of herds, estimated at £3,315 13s. 10d., which sum was exclusive of the salaries of two office assistants attached to the Department for the carrying out of records and statistical work and whose salaries are paid direct by the Milk Board.

The operations of the account for the financial year 1953-54 are shown hereunder:—

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Balance at 1st July, 1953			By Salaries	2,426	6 3
„ Contributions—			„ Travelling Expenses	451	15 7
1952-53	66	8 10			
1953-54	2,350	11 6			
		2,417			
		0 4			
		£2,878			£2,878
		1 10			1 10

Potato Growers' Licensing Act.

The Potato Growers' Licensing Act, 1940-1952, requires all persons who use an area of land exceeding one acre for the production of potatoes to obtain a licence under the Act. Application for licence or for the renewal of a licence shall be accompanied by a fee. The fee is prescribed by section 3 (2) of the Act and was increased from 10s. to £1 as from 1st December, 1952.

The licence fees collected and any penalties imposed under the Act are paid into a special account at the Treasury. The Colonial Treasurer shall, upon the recommendation of the Minister for Agriculture, pay out of such special account moneys—

(a) to any society registered under the Co-operation Act, 1923-1938, or any other association or body of persons which, to the satisfaction of the Minister, will wholly apply such moneys to the promotion of the production, marketing, treatment and sale of potatoes;

(b) to be used in any other manner which the Minister deems to be best calculated to develop or protect the potato growing industry.

Any moneys so paid shall be expended for such purposes in furtherance of the interests of the potato growers of New South Wales as in any particular case the Minister may approve, or generally as may be prescribed.

The transactions on the Special Deposits Account for the financial year 1953-54 are as follows:—

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Balance at 1st July, 1953			By Grants to Potato Growers' Association	1,400	0 0
„ Collections—			„ Cost of Administration	209	18 4
Licence Fees	2,078	12 0	„ Printing	36	19 2
Less Refunds	4	0 0	„ Balance at 30th June, 1954	771	8 6
		2,074			
		12 0			
		£2,418			£2,418
		6 0			6 0

Grant by McGarvie Smith Institute towards the Running Expenses of the Nutrition Station at Shannon Vale.

A Nutrition Station was established in 1938 in the New England district for the purpose of carrying out a series of experiments associated with anaemia in sheep. The estimated working costs were £400 per annum, less revenue to be received from the sale of wool. The McGarvie Smith Institute agreed to provide the difference between the amount received from the sale of wool and £400 each year for a term of five years. The first contribution of £200 was received in 1938. In July, 1943, the Institute approved of the continuance

of the subsidy for a further period of five years and from 1st January, 1946, the subsidy was increased to £600 per annum, less revenue from the sale of wool. In October, 1948, the Institute agreed that the subsidy would continue for a further period of five years.

Grants received from the Institute and the proceeds from the sale of wool are credited to a Special Deposits Account.

Transactions on the account for the financial year 1953-54 are shown hereunder:—

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Balance at 1st July, 1953	3,296	4 3	By Wages	795	6 0
„ Sale of Sheep	275	16 2	„ Workers' Compensation Premiums	12	7 0
„ Sale of Sheepskins	31	17 2	„ Payroll Tax (1952-53)	20	11 4
„ Sale of Wool	2,300	2 5	„ Purchase of Sheep	583	0 0
„ Refund of Workers' Compensation Insurance			„ Purchase and Installing of Plant	132	19 10
Premiums, 1952-53	1	3 7	„ Purchase of Calculator	312	11 11
„ Refund on Drums	6	0 0	„ Plant Repairs and Hire	63	16 11
			„ Farm Supplies	840	15 0
			„ Freight and Cartage	148	13 4
			„ Fencing	221	14 6
				3,131	15 10
			„ Balance at 30th June, 1954	2,779	7 9
		£5,911			£5,911
		3 7			3 7

Flood Relief.

On 20th February, 1954, and following days, major floods, attended by cyclonic conditions, occurred in certain of the Coastal Rivers on the North Coast of the State. Funds were made available to the Flood Relief Committee by the Commonwealth and State Government on a £ for £ basis for the making of grants to farmers and householders who suffered loss which placed them in necessitous circumstances.

At the close of the financial year grants had been made to 841 primary producers and 2,020 householders, while 192 accounts had been paid for supplies and services. The expenditure to 30th June, 1954, amounted to £215,469 18s. 3d.

Expenditure for the financial year on earlier floods was as follows:—

	£	s.	d.
Kempsey and other North Coast and North-west Districts (1949)	5,838	3	10
North Coast, Central Coast, Hunter River and other Districts (1950)	7,941	7	7

RURAL TRAINING OF EX-SERVICE PERSONNEL.

At the request of the Prime Minister, the State Government undertook on behalf of the Commonwealth a rural training scheme for ex-service personnel and to make available for the purpose the necessary staff and facilities. Training has been provided at Hawkesbury Agricultural College, Wagga Agricultural College and Experiment Station, Yanco Experiment Farm and on the properties of approved farmers.

The cost of training students at the Hawkesbury Agricultural College since the inception of the scheme is as follows:—

Financial year.	Amount.
	£ s. d.
1943-44 to 1951-52	93,354 6 1
1952-53	733 14 6
	£94,088 0 7

Expenditure in respect of 1953-54 will be published in the next Annual Report.

It was found necessary at the commencement of the first term in 1948 to locate a number of first-year trainees in the Hawkesbury Agricultural College Diploma of Agriculture Course at the Wagga Agricultural College and Experiment Station owing to the inadequacy of accommodation at Hawkesbury Agricultural College. The cost of the training of the students at Wagga was £6,120 13s. 7d. Upon completion of the residence of students at Wagga, trainees were transferred to Hawkesbury Agricultural College at the commencement of their third-year training early in 1950.

The cost of conducting the short-term course at the Wagga Agricultural College and Experiment Station and the Yanco Experiment Farm and the expenses associated with the trainees located with approved farmers is as under:—

Financial Year.	Amount.
	£ s. d.
1945-46 to 1952-53	208,313 11 4
1953-54	3,147 11 10
	£211,461 3 2

Commonwealth Dairy Industry Extension Grant.

The Commonwealth Government has agreed to the continuance of the grant for a period of five years, ending 30th June, 1958, under the terms and conditions set out in the Department's Report for the year ended 30th June, 1953.

The first grant was received in October, 1948, and the expenditure to 30th June, 1954, amounted to £347,313 19s. 2d. under the following headings:—

Item.	1948-49 to 1952-53.	1953-54.	Total.
	£ s. d.	£ s. d.	£ s. d.
Organising Officers ...	58,514 19 5	8,949 1 8	67,464 1 1
General Publicity	30,937 0 6	2,887 15 8	33,824 16 2
Demonstrations	91,291 8 0	8,696 17 8	99,988 5 8
Competitions	7,437 7 4	.....	7,437 7 4
Sire Surveys	4,262 17 7	2,929 12 3	7,192 9 10
Field Days	88 15 7	.....	88 15 7
Wastage Surveys	9,288 5 5	638 5 9	9,926 11 2
Herd Recording	66,893 8 5	17,842 9 5	84,735 17 10
Artificial Insemination	20,024 1 10	10,241 2 10	30,265 4 8
Statistical Work	3,437 5 8	2,953 4 2	6,390 9 10
	£ 292,175 9 9	55,138 9 5	347,313 19 2

EXPANSION OF AGRICULTURAL ADVISORY SERVICES.

The Commonwealth Government has approved of the continuation of the Extension Services Grant for a period of five years ending 30th June, 1957, at an amount of £200,000 per annum.

At a meeting of the Standing Committee on Agriculture held in April, 1953, it was decided to recommend to the Agricultural Council, that whatever moneys were granted by the Commonwealth to the States under the Extension Services Grant for the financial years 1953-54 to 1956-57 inclusive, should be allotted to the respective States in the same proportions as the £176,000 made available for use of the States in 1952-53. Under this allocation New South Wales received £50,000 per annum.

From the commencement of the grant to 30th June, 1954, the Commonwealth Government approved of projects amounting in all to £84,069. Towards these works it advanced £27,255 in 1952-53 and £26,773 in 1953-54, a total of £54,028. The actual expenditure in 1952-53 was £981 8s. 11d., and in 1953-54 £45,303 5s. 9d., or £46,284 14s. 8d. in all, leaving a balance on the grant account at 30th June, 1954, of £7,743 5s. 4d.

Subsequent to 1st July, 1953, the Department found that sufficient funds would not be available to cover all the approved projects and cancelled works to the value of £8,088, reducing the estimated total cost of approved projects at 30th June, 1954, to £75,981.

Argentine Ant Eradication Campaign.

At the request of the Premier, the Department of Local Government made a survey of the Argentine Ant problem and, after discussions with representatives of the Department of Agriculture; the Commonwealth Scientific and Industrial Research Organisation and Municipal Councils, in whose areas the ant had made its appearance, an eradication campaign was formulated. The work commenced in December, 1952, and continued until 8th June, 1953. Details of the work carried out during this period appear at pages 73 and 74 of the Department's Report for the year ended 30th June, 1953.

The campaign was recommended on 15th September, 1953, and continued until 18th December, 1953, and then discontinued until 9th March, 1954. It was carried on until 14th May, 1954.

Following are details of the areas treated, quantities of spraying materials used, etc., during the financial year 1953-54:—

Municipality.	Area Sprayed (acres).	Spray Applied.	
		Gallons.	Per Acre.
			(approximate gallons).
Auburn	525.4	27,314	52
Bankstown	19.7	1,167	59.2
Botany	51.6	2,858	55.5
Canterbury	5.5	335	60.9
City of Sydney	97.8	5,808	59.4
Department of Railways (Yennora)	10.4	448	43.1
Drummoyne	3.0	244	81.3
Kogarah	30.8	1,998	64.9
Parramatta	23.1	5,214	225.7
Randwick	5.4	373	69.1
Strathfield	78.6	4,399	56
Waverley	13.9	810	58.3
	865.2 (acres).	50,968 (galls.)	58.9 (galls.)

The financial operations in connection with the campaign are shown in the following statement:—

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Balance as at 1st July, 1953	793	5 10	By Wages	4,467	0 9
„ Consolidated Revenue Appropriation, 1953-54	4,000	0 0	„ Travelling Expenses	38	15 7
„ Contributions by Councils—			„ Plant	3	14 2
Auburn	1,879	2 6	„ Stores	8	5 10
Bankstown	105	1 8	„ Spray Materials	3,691	19 10
Botany	713	5 11	„ General Expenses	185	0 3
Canterbury	52	3 10	„ Motor Vehicle Maintenance	162	4 9
City of Sydney	716	9 3	„ Repairs to Plant and Machinery	246	4 8
Drummoyne	0	16 2	„ Payroll Tax	173	6 0
Kogarah	128	7 9	„ Postages	62	9 7
Maritime Services Board ..	1,027	0 0	„ Balance at 30th June, 1954	870	5 4
Randwick	58	17 11			
Strathfield	342	12 10			
Waverley	92	3 1			
	5,116	0 11			
	£9,909	6 9		£9,909	6 9

Meat Inspection Service.

The Meat Inspection Service was transferred from the Metropolitan Meat Industry Board to the Department of Agriculture on 1st July, 1952.

The Metropolitan Meat Industry Board meets the costs of the service rendered to that undertaking. The cost of the

service outside the Homebush Abattoir area is covered by fees prescribed by Regulation under the Act.

The following statement shows the cost of the service, payments made by the Metropolitan Meat Industry Board, Government Institutions and the Health Department, and the revenue received from inspection fees charged under the Act:—

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
Homebush Abattoir—			Salaries	51,676	4 9
Metropolitan Meat Industry Board	56,823	13 1	Workers' Compensation Insurance	880	0 0
			Freight, Cartage and Packing	0	19 10
			Postal, &c. Services	43	17 1
			Stores, &c.	742	3 3
			Stationery	76	7 11
			Endowment Fund Subsidy	1,277	8 7
	£56,823	13 1		£54,697	1 5
Other Slaughterhouses—			Salaries	58,450	4 4
Inspection Fees—			Workers' Compensation Insurance	1,220	0 0
Regulation 7	56,142	12 11	Tea Money	4	1 0
Regulation 8	10,527	1 1	Rent	117	11 6
Regulation 9	20,828	1 1	Travelling Expenses	4,839	10 8
Regulation 10	670	7 6	Freight	16	10 9
Government Institutions	400	0 0	Postal, &c. Services	183	7 1
			Advertising	6	19 8
			General Stores	536	9 11
			Electricity	3	10 6
			Stationery	127	17 0
			Endowment Fund Subsidy	1,642	3 7
	£88,568	2 7		£67,148	6 0
Knackeries—			Salaries to	1,314	8 2
Health Department	2,128	2 4	Travelling Expenses	500	12 10
	£2,128	2 4	Endowment Fund Subsidy	52	15 11
				£1,867	16 11
			Total Receipts	147,519	18 0
			Total Payments	123,713	4 4
			Excess of Receipts over payments for financial year	£23,806	13 8

Cattle Compensation Act, 1951.

This Act came into operation on 1st September, 1952. Compensation is paid in the following cases—

- (a) where an animal is destroyed under order of an inspector (Stock Diseases Act, Meat Industry Act, or Cattle Slaughtering Act) because of specified diseases;

- (b) where the carcase of an animal is condemned as unfit for human consumption by any such inspector because of such disease.

Section 9 (2) of the Act provides that 20 per cent. of the compensation payable in respect of tuberculosis during the period of three years after the commencement of the Act shall be paid by the Colonial Treasurer out of moneys provided by Parliament for the purpose. During the financial year 1953-54, 5,928 claims were passed for payment, covering 12,082 head of cattle. Compensation paid amounted to £196,350 18s. 2d.

The following tabulation shows the various diseases for which cattle were condemned and the amount of compensation paid:—

PAYMENTS FOR CATTLE COMPENSATION.
1st July, 1953, to 30th June, 1954.

Disease.	No. of Claims	No. of Cattle	Amount of Compensation Paid.		Total Compensation Paid.
			Special Deposits Cattle Compensation Fund—Item 185.	Consolidated Revenue Fund Section 9 (2) of Act.	
			£ s. d.	£ s. d.	£ s. d.
Tuberculosis ...	4,618	10,258	136,884 3 6	34,206 8 1	171,090 11 7
Cancer	497	675	10,004 4 6	.....	10,004 4 6
Pleuro-Pneumonia	30	98	1,191 13 0	.....	1,191 13 0
Contagiosa	776	1,043	13,859 14 11	.....	13,859 14 11
Actinomycosis ..	3	3	94 0 0	.....	94 0 0
John's Disease ...	4	5	110 14 2	.....	110 14 2
Trichomoniasis ...					
Totals	5,928	12,082	162,144 10 1	34,206 8 1	196,350 18 2
Plus Commission on Stamps sold by Stamp Duties Office ...			776 10 7	.....	776 10 7
Plus payments for valuations by independent valuers			1 1 0	.....	1 1 0
TOTAL EXPENDITURE ...£			162,922 1 8	34,206 8 1	197,128 9 9

The amount of commission received by the Stamp Duties Commissioner on the sale of Duty Stamps amounted to £776 10s. 7d.

The balance on the Fund at 30th June, 1954, was £9,544 5s. 7d.

COUNTRY KILLING CENTRES.

The capital expenditure incurred by the Government on the erection of Country Killing Centres to 30th June, 1954, was as follows:—

	£	s.	d.
Goulburn	419,063	12	6
Wagga	417,088	13	7
Dubbo	405,303	15	2
Gunnedah	75,193	10	5
	£1,316,649	11	8

The operations for the financial year ended 31st December, 1953, resulted in a surplus of income over expenditure in the case of Goulburn £11,460 2s. 5d. and a loss of £279 4s. 2d. at Wagga. In arriving at these results, Goulburn set aside £9,035 18s. 4d. for the purchase of assets and £3,714 16s. 6d. in reduction of loans and advances. Capital expenditure charged against revenue at Wagga for the year amounted to £11,929 1s. 11d. for assets and £6,961 13s. 5d. in reduction of loans and advances.

GOVERNMENT GRAIN ELEVATORS.

Statement of Receipts and Payments—Consolidated Revenue Fund—Financial Year 1953-54.

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Handling Fees	727,713	3 8	By Salaries and Payments in the Nature of Salary	230,028	5 6
„ Sales of Inferior Grain	3 19 6		„ Maintenance and Working Expenses	137,346	14 7
Less Receipts Returned	42 1 8		„ Agents' Commission and Remuneration for Services Rendered	27,038	11 5
„ Rent of Wheat Stacking Sites	399	7 6	„ Rent of Wheat Stacking Sites	6,000	0 0
„ Hire of Test Weights	80	0 0	„ Purchase of Plant and Equipment	2,009	10 9
			„ Purchase of Motor Vehicles	2,385	18 6
				£404,809	0 9
			„ Balance	323,345	8 3
				£728,154	9 0
	£728,154	9 0			

STATEMENT OF REVENUE AND RECEIPTS—CONSOLIDATED REVENUE FUND—FINANCIAL YEAR, 1953-54.

Institution.	Sale of Farm Produce and Livestock, etc.	Students' Fees.	Rents, etc.	Other Receipts.	Gross Receipts.	Receipts Returned.	Net Receipts.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Hawkesbury Agricultural College	13,313 19 6	19,129 12 6	2,426 10 8	881 5 5	35,751 8 1	467 8 7	35,283 19 6
Wagga Agricultural College and Experiment Station	10,035 8 8	5,168 6 8	873 7 4	277 14 8	16,354 17 4	82 10 9	16,272 6 7
Bathurst Experiment Farm ...	8,331 18 4	.....	.....	15 2 3	8,347 0 7	.....	8,347 0 7
Berry Artificial Stock Breeding Station	1,373 17 6	.....	.....	0 2 0	1,373 19 6	0 11 0	1,373 8 6
Condobolin Experiment Farm	5,890 7 1	.....	.....	7 3 5	5,897 10 6	38 9 9	5,859 0 9
Cowra Experiment Farm	2,888 8 0	.....	.....	21 3 2	2,909 11 2	.....	2,909 11 2
Gosford Citrus Experiment Station	1,120 12 9	.....	.....	.....	1,120 12 9	10 7 3	1,110 5 6
Grafton Experiment Farm	9,839 16 0	.....	.....	76 11 4	9,916 7 4	14 8 8	9,901 18 8
Griffith Viticultural Nursery ...	1,244 15 3	.....	.....	.....	1,244 15 3	.....	1,244 15 3
Leeton Experiment Farm	4,721 1 9	.....	.....	67 12 1	4,788 13 10	.....	4,788 13 10
New England Experiment Farm	6,122 17 0	.....	.....	64 2 0	6,186 19 0	5 16 6	6,181 2 6
Seven Hills Poultry Experiment Station	6,445 10 0	.....	.....	6 7 11	6,451 17 11	.....	6,451 17 11
Tamworth Agricultural Research Station	261 10 1	.....	.....	.....	261 10 1	.....	261 10 1
Temora Experiment Farm	5,054 7 3	.....	.....	20 3 4	5,074 10 7	19 4 0	5,055 6 7
Trangie Agricultural Experiment Station	19,723 2 6	.....	384 5 10	285 9 3	20,392 17 7	145 9 1	20,247 8 6
Wollongbar Experiment Farm	7,488 10 9	.....	.....	21 0 1	7,509 10 10	35 0 0	7,474 10 10
Yanco Experiment Farm	9,733 5 9	.....	183 5 4	30 4 2	9,946 15 3	5 9 0	9,941 6 3
Less Receipts Returned	113,589 8 2	24,297 19 2	3,867 9 2	1,774 1 1	143,528 17 7	824 14 7	142,704 3 0
	612 16 4	207 14 6	4 3 9	.....	824 14 7	824 14 7	.....
Total	112,976 11 10	24,090 4 8	3,863 5 5	1,774 1 1	142,704 3 0	.....	142,704 3 0

Statement of Revenue and Receipts, 1953-54—continued.

Section.	Particulars.	Receipts (Gross).	Receipts Returned.	Net Receipts.
		£ s. d.	£ s. d.	£ s. d.
Central Administration	Fees—Farm Produce Agents Act	311 1 0	.....	311 1 0
	Fees—Fertilizers Act	201 12 0	6 6 0	195 6 0
	Fees—Veterinary Surgeons Act	735 0 0	10 10 0	724 10 0
	Fees—Registration of Stock Brands	1,567 0 4	32 1 6	1,534 18 10
	Fees—Stock Foods and Medicines Act	1,163 8 0	11 11 0	1,151 17 0
	Fees—Apiaries Act	2,371 10 0	11 8 5	2,360 1 7
	Fees—Pest Destroyers Act	433 13 0	9 9 0	424 4 0
	Fees—Public Officers	22 8 5	.....	22 8 5
	Fees—Analyses	4 2 6	.....	4 2 6
	Fees—Flour Certificates	917 13 0	.....	917 13 0
	Fees—Testing Dairy Glassware	216 1 3	.....	216 1 3
	Forfeiture of Bonds	1,144 7 0	.....	1,144 7 0
	Fines and Forfeitures	41 8 0	.....	41 8 0
	Commission for collection of Public Service Association Professional Officers' Association and Clerical Officers' Association Subscriptions	92 1 9	.....	92 1 9
	Commission for collection of Premiums—Group Assurance Scheme	418 10 7	.....	418 10 7
	Commission for collection of Metropolitan Hospitals Fund and Medical Benefits Fund Contributions ..	84 5 6	.....	84 5 6
	Interest on Advance—Dingo Extermination	34 2 6	.....	34 2 6
	Sale of Government Property	169 19 3	.....	169 19 3
	Sundry Sales	423 9 1	112 17 6	310 11 7
	Transfer of Part Balances	343 19 2	25 2 0	318 17 2
	Exchange on Cheques and Remittances	175 12 11	.....	175 12 11
	Three per cent. Contributions by Pastures Protection Boards	11,888 11 5	.....	11,888 11 5
	Broadcasting Fees	84 2 9	73 7 9	10 15 0
	Postages	48 3 9	0 5 9	47 18 0
	License Fees—Pastures Protection Act	9 0 0	.....	9 0 0
	Contributions re Scholarships	586 6 9	.....	586 6 9
	Costs recovered by Crown Solicitor in various actions .....	.....	.....	.....
	Total	23,487 9 11	292 18 11	23,194 11 0
Division of Plant Industry	Fees—Seed Testing	76 17 6	9 4 0	67 13 6
	Fees—Certification of Seed, etc.	2,633 12 9	3 0 0	2,360 12 9
	Contribution by Commonwealth Government— Administration of Plant Quarantine	784 3 1	.....	784 3 1
	Commonwealth Contribution towards cost of Ex- perimental and Demonstration Work in connection with Tobacco Leaf Production	1,945 9 11	.....	1,945 9 11
	Total	5,440 3 3	12 4 0	5,427 19 3
Division of Horticulture	Inspection Fees—Plant Diseases Act	17,415 0 6	7 1 0	17,407 19 6
	Fees—Certification of Seed Potatoes	772 9 6	1 15 0	770 14 6
	Contribution by Commonwealth Government— Administration of Plant Quarantine	16,783 12 10	.....	16,783 12 10
	Contribution by Commonwealth Government— Administration of Commerce Act	5,293 10 1	.....	5,293 10 1
	Total	40,264 12 11	8 16 0	40,255 16 11
Division of Dairying	Commonwealth Grant—Herd Recording	17,842 9 5	.....	17,842 9 5
	Fees—Herd Recording	28,131 12 1	56 19 3	28,074 12 10
	Fees—Dairy Industry Act	631 7 0	.....	631 7 0
	Fees—Dairy Science Schools	154 13 6	.....	154 13 6
	Total	46,760 2 0	56 19 3	46,703 2 9
Division of Animal Industry— Head and District Offices.	Fees—Cattle Export	17 13 0	.....	17 13 0
	Fees—Chicken Sexing Examinations	0 10 6	.....	0 10 6
	Fees—Inspection of Honey	9 9 0	0 10 0	8 19 0
	Fees—T.B. Tests of Cattle	141 11 0	.....	141 11 0
	Fees—Vaccination of Calves	39 0 0	0 2 0	38 18 0
	Contribution by Commonwealth Government— Administration of Animal Quarantine	13,910 9 8	.....	13,910 9 8
	Fees—Meat Industry Act	147,519 18 0	40 16 2	147,479 1 10
	Contribution re Testing for Tuberculosis of Herds	2,878 1 10	.....	2,878 1 10
	Sale of Livestock, Sheepskins, etc.—Glenfield Veterin- ary Research Station	1,276 15 0	.....	1,276 15 0
	Private Telephone Calls—Glenfield Veterinary Re- search Station	18 19 4	.....	18 19 4
	Electricity supplied to Officers—Glenfield Veterinary Research Station	86 19 6	.....	86 19 6
	Exchange on Cheques and Remittances—Glenfield Veterinary Research Station	1 10 0	.....	1 10 0
	Subsidies to Glenfield Veterinary Research Station ..	1,199 17 1	.....	1,199 17 1
	Total	167,100 13 11	41 8 2	167,059 5 9

State of Revenue and Receipts, 1953-54—continued.

Section.	Particulars.	Gross Receipts.	Receipts Returned.	Net Receipts.
Division of Animal Industry— Queensland Border.	Fees for Dipping Stock	£ s. d. 799 14 4	£ s. d.	£ s. d. 799 14 4
	Exchange on Cheques and Remittances.....	1 13 1	.....	1 13 1
	Total	801 7 5	.....	801 7 5
Division of Animal Industry— Tick Quarantine Areas.	Fumigation Fees	21 7 5	.....	21 7 5
	Contribution by Commonwealth in respect of Cattle Tick Eradication	53,325 0 0	.....	53,325 0 0
	Total	53,346 7 5	.....	53,346 7 5
Botanic Gardens and Allied Activities.	Rents exclusive of Land	1,621 12 3	.....	1,621 12 3
	Lavatory Takings	254 18 3	.....	254 18 3
	Contribution by Commonwealth Government— Maintenance of Gardens at Admiralty House	4,271 18 1	.....	4,271 18 1
	Total	6,148 8 7	.....	6,148 8 7
Grain Elevators	Rental of Wheat Stacking Sites	399 7 6	.....	399 7 6
	Handling Fees, etc.	727,717 3 2	42 1 8	727,675 1 6
	Hire of Test Weights	80 0 0	.....	80 0 0
	Total	728,196 10 8	42 1 8	728,154 9 0
	Grand Total—Central Administration, etc.	1,071,545 16 1	454 8 0	1,071,091 8 1
Department of Agriculture	Repayments to Credit of Votes—Previous Years	18,821 0 8	.....	18,821 0 8

SUMMARY OF RECEIPTS.

Agricultural Colleges, Farms, Stations and Nurseries	£ s. d. 143,528 17 7	£ s. d. 824 14 7	£ s. d. 142,704 3 0
Central Administration, etc.	1,071,545 16 1	454 8 0	1,071,091 8 1
Department of Agriculture—Repayments to Credit of Votes—Previous Years	18,821 0 8	.....	18,821 0 8
	£ 1,233,895 14 4	1,279 2 7	1,232,616 11 9

GOVERNMENT GRAIN ELEVATORS.

Season.	No. of Country Elevators used.	Storage Capacity of Silos used, including Terminals.	Harvest.	Received at Elevators Country and Terminals (ex Growers).	Proportion of Wheat received in Elevators.		Received in Country Elevators (ex Growers).	Received at City Ter- minals ex non-Silo Stations (ex Growers).	Wheat ex Bag Stacks, Interstate, etc., handled through Silos.	Delivered from Country and Ter- minals to Mills, etc., Produce, Trade and Stock Feed.	Shipped Overseas in bulk—year ended 30th June.		Total Shipped from N.S.W. year ended 30th June.	Per cent- age ship- ped in bulk of total Ex- ported.
					To total Crop.	To total quantity received at Rail.					Year.	Quantity.		
1920-21	28	bushels.	bushels.	bushels.	%	%	bushels.	bushels.	bushels.	bushels.	1921	bushels.	bushels.	%
1921-22	28	12,200,000	55,625,000	1,941,694	3.49	4.2	1,941,694	.....	.....	110,560	1921	↑	22,855,092	...
1922-23	46	12,200,000	42,767,000	4,336,833	10.14	12.7	3,247,664	1,089,169	.....	1,485,443	1922	↑	29,754,284	...
1923-24	52	16,700,000	28,668,000	4,596,563	16.03	21.2	4,289,851	306,712	.....	1,285,625	1923	↑	2,776,897	...
1924-25	61	18,400,000	33,176,000	6,438,752	19.4	25.4	5,410,521	1,028,231	.....	3,089,040	1924	12,428,109	5,305,255	45.77
1925-26	62	20,000,000	59,767,000	17,771,871	29.7	35.1	16,334,813	1,437,058	.....	4,994,309	1925	13,030,567	31,825,550	40.94
1926-27	66	20,930,000	33,806,000	9,136,333	27.02	34.9	8,295,148	841,185	.....	4,809,379	1926	4,946,881	10,738,369	46.07
1927-28	65	20,650,000	47,541,000	12,760,268	26.84	34.5	12,244,496	515,772	.....	6,961,139	1927	4,358,520	10,762,454	40.497
1928-29	84	22,433,000	27,042,000	6,347,176	23.47	32.3	6,177,720	169,456	.....	4,493,787	1928	2,924,404	4,952,415	59.05
1929-30	81	21,423,000	49,257,000	15,139,488	30.8	36.7	14,777,879	397,786	.....	9,192,716	1929	6,335,883	18,936,405	33.46
1930-31	81	21,423,000	34,407,000	8,886,743	25.83	34.2	8,739,874	146,869	.....	7,380,320	1930	93,177	852,740	10.93
1931-32	105	23,123,000	65,877,000	23,673,088	35.94	41.25	22,948,116	724,972	.....	8,309,141	1931	12,194,719	31,055,234	39.268
1932-33	111	23,363,000	54,966,000	26,000,886	47.30	53.06	22,877,542	2,123,345	.....	9,616,830	1932	16,702,582	28,114,344	59.41
1933-34	119	24,443,000	78,870,000	34,455,411	43.68	52.21	33,954,534	500,877	.....	10,191,040	1933	21,619,465	31,675,795	68.252
1934-35	149	28,588,000	57,657,000	21,796,503	38.2	41.9	21,229,927	566,575	.....	11,831,117	1934	8,154,887	10,312,822	79.075
1935-36	158	29,278,000	48,822,000	21,509,227	44.2	54.6	21,509,227	.....	.....	9,734,743	1935	10,840,550	15,277,767	70.96
1936-37	175	30,623,000	55,668,000	25,107,623	51.4	62.8	24,811,726	295,897	.....	11,145,176	1936	21,786,976	23,200,324	93.91
1937-38	175	31,523,000	55,104,000	29,230,560	52.5	64.3	29,087,579	142,981	.....	11,033,509	1937	19,253,441	20,250,844	95.07
1938-39	173	31,123,000	59,898,000	32,680,043	59.3	72.5	32,533,477	146,566	.....	15,826,452	1938	15,055,364	16,315,415	92.28
1939-40	175	31,823,000	76,552,000	27,898,443	46.6	59.9	27,590,667	307,776	.....	14,921,431	1939	12,925,676	15,030,820	85.99
1940-41	159	30,228,000	23,933,000	39,208,038	51.2	62.3	38,912,339	295,699	.....	26,516,309	1940	9,527,916	13,105,795	72.7
1941-42	180	32,778,000	45,500,000	11,469,347	47.9	74.5	11,453,207	7,140	.....	10,947,307	1941	5,869,097	9,722,153	60.3
1942-43	180	32,778,000	51,693,000	25,547,353	52.7	68.00	25,161,315	385,138	.....	21,409,319	1942	2,069,654	2,350,062	88.0
1943-44	180	32,778,000	47,500,000	26,089,372	50.5	60.7	26,089,372	.....	.....	25,011,213	1943	2,475,064	3,419,642	72.3
1944-45	181	32,778,000	51,693,000	19,276,772	40.6	50.3	19,276,772	.....	.....	19,258,100	1944	.....	420,013	.....
1945-46	178	32,718,000	65,520,000	5,467,138	31.9	53.1	5,467,138	.....	.....	5,485,324	1945	137,783	193,635	71.1
1946-47	175	32,718,000	55,620,000	25,825,915	41.3	50.3	25,825,915	.....	.....	21,349,360	1946	2,611,563	2,806,683	93.01
1947-48	181	32,778,000	95,227,000	5,835,923	37.2	77.6	5,835,923	.....	5,799,533	11,496,192	1947	1,933,814	3,386,190	57.11
1948-49	181	32,778,000	43,301,968	45.5	53.1	43,029,765	272,203	16,948,616	19,814,958	19,814,958	1948	20,452,293	19,322,340	.....
1949-50	180	32,778,000	36,103,108	55.8	61.9	36,103,108	.....	2,693,710	23,023,188	23,023,188	1949	28,875,905	35,321,968	81.75
1950-51	180	32,778,000	40,296,685	49.18	57.7	40,208,521	88,164	7,353,772	20,370,287	20,370,287	1950	25,140,365	27,714,228	90.71
1951-52	215*	44,228,000*	26,471,194	61.17	70.08	26,469,677	1,517	.....	20,370,287	20,370,287	1951	11,707,298	13,171,051	88.89
1952-53	219*	47,038,000*	27,966,626	70.46	82.61	27,857,781	108,845	.....	27,471,221	27,471,221	1952	3,786,428	8,700,555	.....
1953-54	219*	50,628,000*	39,475,036	70.90	76.54	39,353,438	121,598	.....	25,973,564†	25,973,564†	1953	7,982,175	7,982,175	89.90
			45,402,617‡	69.85‡	80.26‡	45,359,272‡	43,345	826	11,034,444‡	11,034,444‡	1954	8,200,609	7,904,773	.....

* Includes sub-terminals and bulkheads at non-Silo Stations.

† Not available.

‡ Subject to alterations—operations not completed.

OTHER ACCOUNTS.

Name of Account.	Balance as at 1st July, 1953.	Receipts 1953-54.	Payments 1953-54.	Balance as at 30th June, 1954.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Advances to Officers for purchase of motor cars	Dr. 59,774 2 11	21,224 4 1	33,949 13 1	Dr. 72,499 11 11*
Contribution Towards Running Expenses of Tractor Mower at Centennial Park	64 18 11	165 0 0	109 4 2	120 14 9*
Potato Growers' Licensing Act, 1940	343 14 0	2,078 12 0	1,650 17 6	771 8 6*
Construction, Maintenance and Improvement of Public Watering Places in the Western Division	223 11 11	758 16 1	981 17 7	0 10 5*
Balance of Salaries Adjustment Suspense Account	36,275 5 9	42,794 12 9	36,275 5 9	42,794 12 9*
Commonwealth and State Contributions—Bush Fire Relief.....	5,622 16 5	133 8 6	1,589 4 6	4,167 0 5*
Contribution by Late Dr. Darnell Smith, towards erection of stone seat overlooking the harbour.....	4 14 11	.....	4 14 11	.....
Government Printing Office—Working Account and Stores Account and Sale of Publications.....	.....	862 18 4	21 7 4	841 11 0*
Ministerial Employees Leave—Payments to Employees or Their Widows, Children, or Dependent Relatives	485 13 0	240 19 5	309 11 2	417 1 3*
Noxious Insects Destruction Account	2,263 6 1	154,404 14 0	128,949 2 7	27,718 17 6*
Poundage Account	0 5 0	.....	0 5 0	.....
Registration of Orchards and Nurseries	112 0 4	.....	112 0 4	.....
Swine Compensation Fund	2,170 6 4	47,344 17 10	42,604 15 5	6,910 8 9*
Treasury Fire Risks.....	954 11 10	.....	114 11 10	840 0 0*
Purchase of Milk and Cream—Hawkesbury Agricultural College ...	4,752 4 6	38,006 2 8	36,372 2 6	6,386 4 8*
Motor Vehicles Purchasing Account.....	300 0 0	.....	.....	300 0 0*
Hawkesbury Agricultural College Canning Factory Account	344 17 4	738 7 7	710 5 2	372 19 9*
Cattle Compensation Fund	29,858 0 10	142,603 17 8	162,917 12 11	9,544 5 7*
Farm Produce Agents' Act, 1926 .....	.....	1,000 0 0	422 2 2	577 17 10*
Unclaimed Moneys Account	879 9 4	1,113 0 4	640 18 11	1,351 10 9*
Rural Training of Ex-Servicemen	2,575 17 1	2,000 0 0	3,147 11 10	1,428 5 3*
Commonwealth Grant towards the Promotion of Improved Practices in the Dairying Industry	2,435 0 7	65,307 19 0	55,739 4 5	12,003 15 2*
Flood Relief—Kempsey and other North Coast and North-Western Districts, 1949	5,838 3 10	.....	5,838 3 10	*
Flood Relief—North Coast, Central Coast, Hunter River and other Districts, 1950	7,882 15 3	58 12 4	7,941 7 7	*
Compensation for Losses sustained from Experiments relating to the Wool Industry	2,000 0 0	.....	.....	2,000 0 0*
Flood Relief Scheme—New South Wales.....	6,528 8 9	.....	5,267 7 8	1,261 1 1*
Argentine Ant Eradication Campaign	793 5 10	9,116 0 11	9,039 1 5	870 5 4*
Commonwealth Grant—Expansion of Agricultural Advisory Services—New South Wales	26,273 11 1	26,773 0 0	45,303 5 9	7,743 5 4*
Flood Relief Scheme, 1954.....	.....	230,261 1 1	215,469 18 3	14,791 2 10*
Hawkesbury Agricultural College Trust Account	663 17 7	6,170 6 6	5,985 18 6	848 5 7*
Wagga Agricultural College Trust Account	849 4 11	826 15 7	801 14 4	874 6 2*
Advertising—Department of Agriculture Publications Account	907 4 0	7,050 18 6	7,443 10 0	514 12 6*
Chicken Sexing—Purchase of Chickens	91 0 0	13 0 0	104 0 0	*
Commonwealth Bank (Rural Credits Development Fund) Grant towards purchase of Cameras for District Officers.....	0 19 10	.....	.....	0 19 10*
Contribution by C.S.I.R.O. towards cost of Research into Metabolic Diseases of Sheep and Endocrinology—Glenfield Veterinary Research Station	1,018 18 5	480 0 0	1,048 7 5	450 11 0*
Contribution by Milk Board towards Cost of Herd Testing	461 1 6	2,417 0 4	2,878 1 10	*
Contribution by Murrumbidgee Milling Co. Ltd. towards establish- ment of Library at Agricultural Research Institute, Wagga.....	.....	100 0 0	.....	100 0 0*
Contribution by Rural Bank for erection of Glasshouse for Hawkes- bury Agricultural College	2,593 8 0	.....	2,593 8 0	*
Contribution by Rural Bank for erection of Glasshouse for Wagga Agricultural College	3,003 3 0	.....	3,003 3 0	*
Damage to certain Paddocks—Satellite Aerodrome at Richmond— Compensation	221 0 10	.....	221 0 10	*
Department of Agriculture Suspense Account.....	1,725 5 8	21,200 19 1	17,525 10 3	5,400 14 6*
Fat Steer Competition—Wagga Abattoir.....	.....	30 0 0	30 0 0	*
Fire Damage Account	426 10 0	.....	.....	426 10 0*
Hawkesbury Agricultural College Egg Laying Competition Prize Fund	410 12 4	333 2 7	144 15 1	598 19 10*
Honey Marketing Board.....	20 0 0	.....	.....	20 0 0*
Horse Breeding Fund	2,245 6 2	.....	.....	2,245 6 2*
Interstate Meat Co. Pty. Ltd.—Bursary—Hawkesbury Agricultural College .....	.....	52 10 0	52 10 0	*
Interstate Meat Co. Pty. Ltd.—Bursary—Wagga Agricultural College .....	.....	52 10 0	48 2 5	4 7 7*
Leeton Machinery Pool Hire Charges Account	1 0 0	8 5 5	8 0 0	1 5 5*
McGarvie Smith Institute—Contribution towards running costs of Nutritional Station at Glen Innes	3,296 4 3	2,644 19 4	3,161 15 10	2,779 7 9*
McGarvie Smith Institute—Contribution to Nutritional Research Laboratory, Glenfield Veterinary Research Station	1,415 0 0	.....	.....	1,415 0 0*
Overseas Trip—Dr. C. J. Magee .....	.....	800 0 0	698 17 0	101 3 0*
Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station	150 4 10	2,098 14 3	1,827 19 8	420 19 5*
W. S. Pender Memorial Fund—Interest on Bonds.....	111 15 3	31 5 0	3 2 6	139 17 9*
Rice Research Laboratory, Yanco	1,000 0 0	.....	.....	1,000 0 0*
Sale of Booklet "The Home Vegetable Garden"	51 0 5	.....	8 12 6	42 7 11*
Sale of Book "Farm Management and Elementary Agricultural Economics"	13 17 8	176 0 0	13 8 9	176 8 11*
Sale of Rural Training Booklets—Wagga	11 10 6	0 8 6	.....	11 19 0*
Sale of Septic Tank Bulletin	2 6 6	2 0 2	3 8 0	0 18 8*
Stamp Duty on Agreement—Wheat Stacking Sites	8 5 0	1 7 6	8 7 6	1 5 0*
State Wheat Pools Account .....	.....	249 10 3	249 10 3	*
Toxaemic Jaundice Investigations	11 18 11	.....	.....	11 18 11*
Tropical Fruit Research Station	5,000 0 0	.....	.....	5,000 0 0*
Unclaimed Salaries and Wages	789 8 7	1,401 9 3	1,562 4 6	628 13 4*
Total	£ 105,709 0 2	833,127 6 10	844,907 1 9	93,929 5 3*

Section.	Consolidated Revenue Fund.					General Loan Account.	Total Expenditure by Department of Agriculture.	Consolidated Revenue Fund.					General Loan.		Grand Total Expenditure.	
	Salaries and Payments in the nature of Salary.	Maintenance and Working Expenses other than Salaries.	Other Services.	Total.	£ s. d.			£ s. d.	£ s. d.	Government Stores Department. (1)	Government Printer.	Real Estate Office.	Department of Public Works. (2)	Department of Public Works.		Total Expenditure by Other Departments.
£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.		
Central Administration	358,899 6 5	37,753 7 7	112,835 8 1	509,488 2 1	.....	509,488 2 1	30,391 14 1	42,531 15 2	301 19 7	14,614 12 1	87,840 0 11	597,328 3 0				
Division of Plant Industry	112,018 11 9	28,373 0 6	3,216 9 0	143,608 1 3	.....	143,608 1 3	.....	541 18 10	.....	973 4 5	1,515 8 3	145,123 4 6				
Division of Horticulture—																
Fruit	72,492 12 10	2,577 17 8	3,414 11 1	96,965 1 7	.....	96,965 1 7	.....	303 3 9	8 9 3	3,053 3 9	3,364 16 9	99,429 18 4				
Export and Import Branch	13,111 10 5	2,577 17 8	.....	16,288 19 8	.....	16,288 19 8	.....	.....	21 14 9	.....	.....	16,310 14 5				
Plant Quarantine Service	11,550 6 10	1,957 8 7	1,950 0 0	14,857 15 5	.....	14,857 15 5	.....	.....	.....	.....	21 14 9	14,857 15 5				
Division of Dairying—																
General	46,809 1 0	14,626 8 0	100 0 0	61,535 9 0	.....	61,535 9 0	.....	364 19 6	.....	1,016 1 9	1,381 1 3	62,916 10 3				
Hawkesbury Agricultural College	18,293 2 8	18,293 8 7	11,490 1 5	70,179 10 8	65,110 4 9	70,179 10 8	.....	788 19 5	3,271 1 9	2,458 4 6	6,468 5 8	70,179 10 8				
Wagga Agricultural College	59,587 4 8	52,172 0 16	9,215 9 10	153,199 6 11	43,378 0 11	218,509 11 8	.....	593 0 1	259 5 1	608 0 11	1,460 6 0	224,777 17 4				
Alstonville Tropical Fruit Research Station	41,138 3 10	22,985 9 8	.....	73,339 3 4	13,640 0 0	116,717 4 3	.....	.....	.....	.....	.....	118,177 10 3				
Bathurst Experiment Farm	13,592 9 1	5,875 11 1	2,420 4 1	21,897 4 3	257 10 11	13,940 0 1	.....	8 3 10	180 9 2	92 4 2	273 13 4	13,640 0 0				
Condobolin Experiment Farm	9,875 4 8	7,689 12 4	3,495 12 11	21,060 9 11	974 3 1	22,034 13 0	.....	.....	.....	63 12 11	22,428 8 6	22,428 8 6				
Cooma Experiment Farm	8,199 2 7	2,683 6 3	148 5 5	11,980 14 3	349 8 6	11,580 2 9	.....	.....	.....	149 2 5	11,744 3 3	11,744 3 3				
Coomalla Research Station	10,049 7 4	1,525 8 9	510 13 11	12,085 10 0	10,538 9 6	10,817 14 11	.....	.....	15 1 1	37 10	12,173 2 1	12,173 2 1				
Gosford Citrus Research Station	24,437 11 6	7,276 11 6	2,164 14 11	33,878 17 11	.....	33,878 17 11	.....	38 6 0	3 7 10	49 11 1	34,370 0 9	34,370 0 9				
Griffith Viticultural Nursery	4,189 18 2	1,371 10 3	178 9 7	5,739 18 0	946 4 8	5,739 18 0	.....	24 15 4	23 2 0	443 5 6	5,827 14 7	5,827 14 7				
Leeton Experiment Farm	12,982 4 6	6,152 14 2	3,551 15 11	22,286 14 7	.....	22,286 14 7	.....	1 10 9	195 2 0	255 5 4	255 14 4	255 14 4				
New England Experiment Farm	11,886 3 6	6,637 12 1	3,344 11 6	29,768 7 1	.....	29,768 7 1	.....	36 8 7	79 5 6	249 6 3	305 0 4	305 0 4				
Seven Hills Poultry Experiment Station	11,595 14 4	5,462 14 6	254 2 0	17,612 10 10	195 9 2	17,808 0 0	.....	0 12 5	42 17 9	23 9 8	18,173 0 4	18,173 0 4				
Tamworth Agricultural Research Station	11,433 17 6	4,539 13 8	3,519 10 0	6,493 1 2	1,045 0 0	7,538 1 2	.....	34 4 0	31 0 0	63 7 3	7,561 10 10	7,561 10 10				
Temora Experiment Farm	11,608 5 11	1,639 13 8	1,601 6 11	17,234 6 1	1,500 0 0	18,734 6 1	.....	11 19 8	31 0 0	278 14 0	18,841 3 6	18,841 3 6				
Wagga Agricultural Experiment Station	18,450 11 10	9,624 13 4	3,062 18 4	31,127 4 8	989 1 3	32,116 5 11	.....	43 2 10	420 6 0	888 15 3	33,029 4 5	33,029 4 5				
Yolongbar Experiment Farm	12,862 16 6	5,798 1 5	232 7 6	18,403 9 5	.....	18,403 9 5	.....	.....	.....	.....	19,700 16 1	19,700 16 1				
Yanco Experiment Farm	31,576 9 0	13,677 19 11	4,658 8 11	49,942 17 10	1,461 3 3	51,404 1 1	.....	.....	.....	.....	52,756 5 2	52,756 5 2				
Yanco Research Station	984 15 2	1,457 9 6	.....	2,442 4 8	.....	2,442 4 8	.....	.....	.....	.....	2,442 4 8	2,442 4 8				
Division of Animal Industry—																
Head District Offices	82,210 7 0	25,979 15 9	35,476 14 8	143,666 17 5	5,191 15 6	148,857 13 1	.....	1,389 11 6	188 3 4	1,050 8 5	146,106 17 4	146,106 17 4				
Glendon Vale Veterinary Research Station	31,133 8 0	10,374 17 4	1,635 2 11	43,143 8 3	.....	43,143 8 3	.....	188 3 4	.....	941 16 0	49,668 10 7	49,668 10 7				
Meat Inspection Service—																
Shannon Vale Nutrition Station	.....	17 12 0	.....	17 12 0	.....	17 12 0	.....	.....	.....	6 2 8	23 14 8	23 14 8				
Homebush	51,676 4 9	1,743 8 1	1,277 8 7	54,697 1 5	.....	54,697 1 5	.....	.....	.....	.....	54,697 1 5	54,697 1 5				
Other Slaughter Houses	58,450 4 4	7,055 18 1	1,642 3 7	67,148 6 0	.....	67,148 6 0	.....	.....	.....	.....	67,148 6 0	67,148 6 0				
Knackeries	7,614 8 2	500 12 10	52 15 11	8,167 16 11	.....	8,167 16 11	.....	.....	.....	.....	8,167 16 11	8,167 16 11				
Animal Quarantine Service	33,810 15 6	736 6 3	.....	8,396 4 8	.....	8,396 4 8	.....	.....	.....	.....	8,396 4 8	8,396 4 8				
Queensland Border	377,229 8 8	123,338 12 5	150 0 0	41,704 1 9	17 19 9	41,722 1 6	.....	.....	.....	.....	41,722 1 6	41,722 1 6				
Tick Quarantine Areas	.....	.....	5,790 4 10	506,378 5 11	.....	506,378 5 11	.....	.....	.....	.....	506,378 5 11	506,378 5 11				
Botanic Gardens and Allied Activities—																
Government Domain	66,147 0 9	9,308 8 1	13,662 1 3	89,117 10 1	.....	89,117 10 1	.....	164 5 11	61 5 0	306 12 5	532 3 4	89,649 13 5				
Government Park	9,226 8 7	931 6 7	80 12 2	10,238 7 2	.....	10,238 7 2	.....	.....	.....	35 19 6	35 19 6	10,274 6 8				
Government Grain Elevators	18,865 4 0	1,788 8 5	5,780 0 0	26,433 12 5	.....	26,433 12 5	.....	.....	19 5 0	51 3 1	26,504 0 6	26,504 0 6				
Experiment Farms—	230,028 5 6	170,885 6 0	4,395 9 3	404,809 0 9	.....	404,809 0 9	.....	.....	.....	330,616 6 1	735,425 6 10	735,425 6 10				
Experiment Farms—Previous Years	.....	.....	.....	Cr. 343 17 0	Cr. 343 17 0	Cr. 343 17 0	.....	.....	.....	.....	Cr. 343 17 0	Cr. 343 17 0				
Totals	1,957,118 11 1	638,899 0 7	241,444 19 1	2,837,462 10 9	145,447 2 2	2,982,909 12 11	30,391 14 1	47,024 17 5	5,137 19 8	28,847 17 4	442,018 14 7	3,424,928 7 6				

(1) Being expenditure on—
Stores, Stationery, Furniture, etc.
Cleaning Services

(2) Being expenditure on—
Electricity and Gas
Maintenance of Public Buildings
Telephones

Expenditure figures not available from Premier's Department.

